ARCHIVES OF OPHTHALMOLOGY.

A REPORT OF FOUR CASES OF ACUTE DISSEMINATED MYELITIS WITH RETROBULBAR DEGENERATION OF THE OPTIC NERVES.[1]

By Dr. WARD A. HOLDEN, New York.

(With seven figures on Text-Plates XIV.–XVII.)

ALL four patients, adults, seen in 1910 at the Neurological Institute of New York, had sensory disturbances in the trunk and limbs and more or less complete paraplegia. These conditions continue to the present time in two patients, while the other two patients died of respiratory paralysis.

Retrobulbar neuritis may precede, accompany, or follow myelitis, but it is no longer regarded as being dependent upon the myelitis. The two have a common cause—a noxious matter circulating in the blood. In this disease, foci of degeneration appear scattered through the spinal cord, and the vessels which run in from the pial sheath to these foci are surrounded by cellular infiltrations. Bielschowsky has found similar changes in the optic nerves and tracts in cases of myelitis. It is still uncertain whether these inflammatory changes are caused by bacteria or whether they are due to the action of toxins.

The fact that these foci of degeneration have an accidental distribution along the arteries entering the optic nerve from the pial sheath would lead us to expect ocular clinical pictures that are unusual, and indeed in two of the cases to be reported here, there were defects in the fields of one eye of a hemianopic character, and in one case there was excessive concentric contraction of the fields of one eye with fair central vision.

[1] Read before the American Ophthalmological Society, July 11, 1911.

An Ascending Myelitis Following a Partial Degeneration of One Optic Nerve.

CASE I.—Mrs. H., a housewife, aged 30, was admitted to the Neurological Institute May 25, 1910, on the service of Doctor Collins.

A few days before Christmas, 1909, she had noticed that the vision of the left eye was becoming blurred, and by Christmas-day the eye was totally blind. Two days later there appeared a paroxysmal stabbing pain in the left side of her face, not of constant location, eased by hot applications, and passing off in a few days. Early in January, 1910, her vision returned in the left eye and gradually improved for a month, since which time it has remained stationary. Her health continued good up to April 25th, when she awoke to find the fingers of her left hand numb. There were then no motor phenomena. April 27th, paræsthesia was noticed in the left foot, and on the following day in the right foot and hand. A feeling of tightness about both legs came on—a garter sensation. April 30th and in the week following there was sharp pain in both shoulders, and stiffness of the legs that rendered walking difficult and later impossible. May 15th, severe shooting pains were felt in the back of the neck and in the occipital region, but not in the arms. There was weakness of the left upper extremity, followed two days later by paralysis. The right upper extremity then became weak and later was paralyzed.

Status: May 25, 1910.

Eyes: Corneal sensibility normal in each eye. Pupils: R. 3.5*mm*, L. 4.5*mm* in diameter, round; light reflex diminished in right. Mobility normal; R. vision $=\frac{20}{30}$, L. vision $=\frac{20}{200}$. Skiascopy showed a slight error of refraction. Fields of the right eye normal. Field of the left for white nearly normal, but for green there was a defect of the temporal half of the field, including the fixation point and encroaching above slightly upon the nasal half of the field.

The right fundus was normal. The left optic disk was pale, particularly in the temporal segment; its margin was blurred, and the arteries on the disk and in the neighboring retina were bordered with white lines, while the veins were of normal calibre and were not tortuous. The appearance of the left disk suggested atrophy of the optic nerve following a retrobulbar neuritis.

The other cranial nerves were normal. There was flaccid palsy of both arms and both legs. Breathing was entirely thoracic. Sensation was variable. A touch with cotton-wool was felt everywhere. A pin-prick was usually perceived, and above the level of the nipples it felt "more

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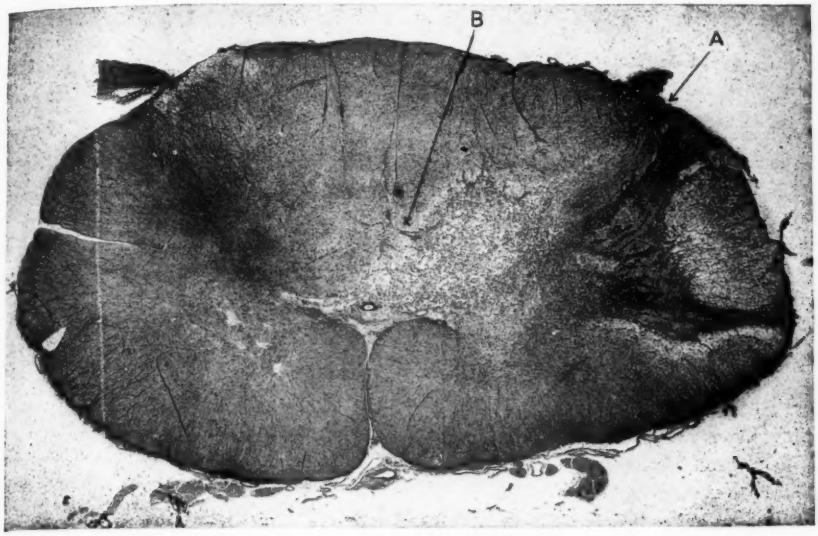

FIG. 1.—Cord of Case 2 at the 6th cervical vertebra. Central softening and two tongues of softening extending out to the pia on the right side.

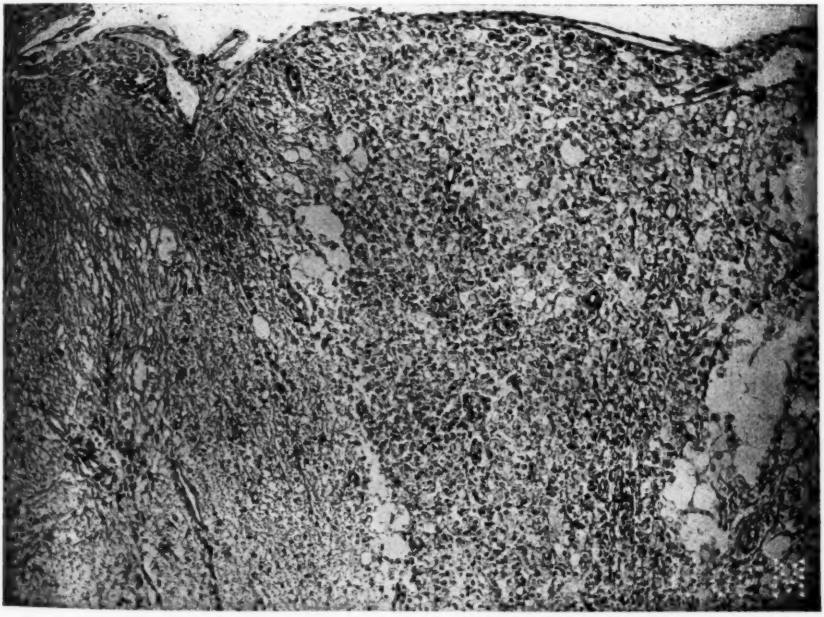

FIG. 2.—Spot A (Fig. 1) more highly magnified. Infiltration about pial vessels. Destruction of nerve tissue with glial overgrowth.

disagreeable." Heat and cold were perceived as warm on the legs, but were felt correctly on the trunk. The reflexes were absent in the arms and abdomen. The knee-jerks and ankle-jerks were present. There was double clonus and Babinski.

There was no heart lesion although there was considerable arrhythmia. The temperature fluctuated between 100° and 103°. The Wassermann reaction was negative. There was no lymphocytosis in the spinal fluid. The urine contained albumen and its specific gravity was 1.010.

Blood: r. b. c. 4,160,000; w. b. c. 9,600; neutrophiles 66; large l. 18; small l. 5.

There were granular degeneration of the red blood corpuscles, poikilocytosis, polyochromatophilia, and anisocytosis.

May 30, 1910, the general condition was much worse and the spines and laminæ of the fourth, fifth, sixth, and seventh cervical vertebræ were removed by Doctor Elsberg. The dura was pale and pulsating. A *2mm* incision was made and clear cerebro-spinal fluid spurted out in large quantities. The wound was closed. Death occurred from respiratory paralysis four hours later.

Only a portion of the cervical cord could be obtained for examination. This with a portion of the cervical cord from Case 4 was studied under the direction of Doctor C. B. Dunlap at the Pathological Institute of the New York Hospitals, and to him my sincere thanks are due. The laboratory of the Neurological Institute was not then fully equipped.

An Ascending Myelitis with Pallor of Both Optic Disks.

CASE 2.—Mrs. S., aged 38, housewife, was admitted to the Neurological Institute on February 25, 1910; service of Doctor Collins.

Three weeks before admission, being one week after the birth of a child, she felt a severe constant pain in the small of the back. With this there were retention of urine and obstinate constipation. Stiffness in the legs was next noticed, and two days later there were paræsthesias, and soon all feeling was lost in the lower half of the body. The arms were not affected and the legs could be moved.

Two days before admission all sensation in the upper half of the body was lost, the fingers tingled and the arms became weak. The pain in the back, which has ceased, returned and became general. There was vomiting, but no headache. She entered the hospital walking with assistance. Vision was said to be good.

Status on admission:

She was paraplegic, and there were anæsthesia and analgesia present below the fourth cervical vertebra, at which level there was a hyperalgesic zone. There was distinct tenderness on pressure over the cervical vertebræ from the second to the fifth. The knee-jerks were normal, the ankle-jerks were present, the abdominal and epigastric reflexes were absent on the right side. There was no ankle clonus, and there was plantar flexion.

Eyes: When the eyes were examined the patient would not co-operate and the acuteness of vision could not be determined. There seemed to be no gross defects in the fields. Pupils and the movements of the eyes were normal. The optic disks were diffusely pale without alterations in the vessels. The state of distinct paleness of the disks was confirmed at a subsequent examination and seemed to indicate a degeneration of the nerves, although no history of previous disturbance of vision was obtained.

March 2d, the general condition was much worse. The anæsthesia and analgesia extended above the clavicles. The Babinski and Oppenheim phenomena were well marked and there was pseudo-clonus.

March 7th, the patient was unable to move any limb, but the head movements were normally performed and the shoulders could be raised. Breathing was thoracic entirely. The temperature ranged from 98° to 100°; Wassermann reaction negative.

March 14th, Doctor Elsberg removed the spines and laminæ of the fourth, fifth, sixth, seventh cervical and of the first dorsal vertebræ. The dura did not pulsate, but felt abnormally tense. Death took place from respiratory paralysis the following day.

Only a portion of the cervical cord could be obtained for examination.

A Myelitis with Complete Atrophy of One Optic Nerve.

CASE 3.—E., a cabman, aged 28, was admitted to the Neurological Institute April 22, 1910, on the service of Doctor Fraenkel.

A year before (May, 1909), without known cause a sharp pain developed above the left hip and in the legs, lasting for two months. A few days after the onset, paraplegia and paresis of the arms came on. His mouth was drawn to the left and there was difficulty in pronouncing words. There was gradual improvement for a time, but in November, 1909, the hands became worse and contractures developed.

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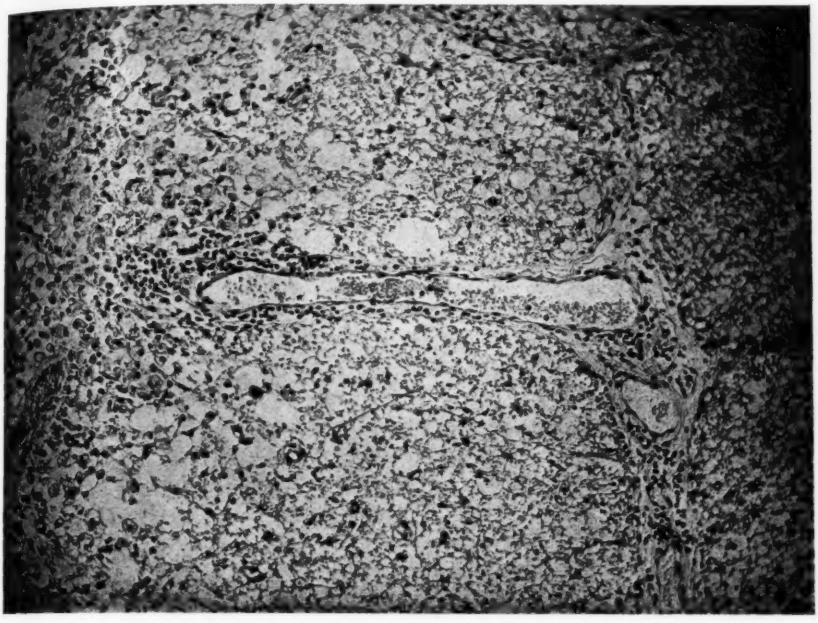

FIG. 3—Spot B, in Fig. 1, showing vessels with cellular infiltrations about them.

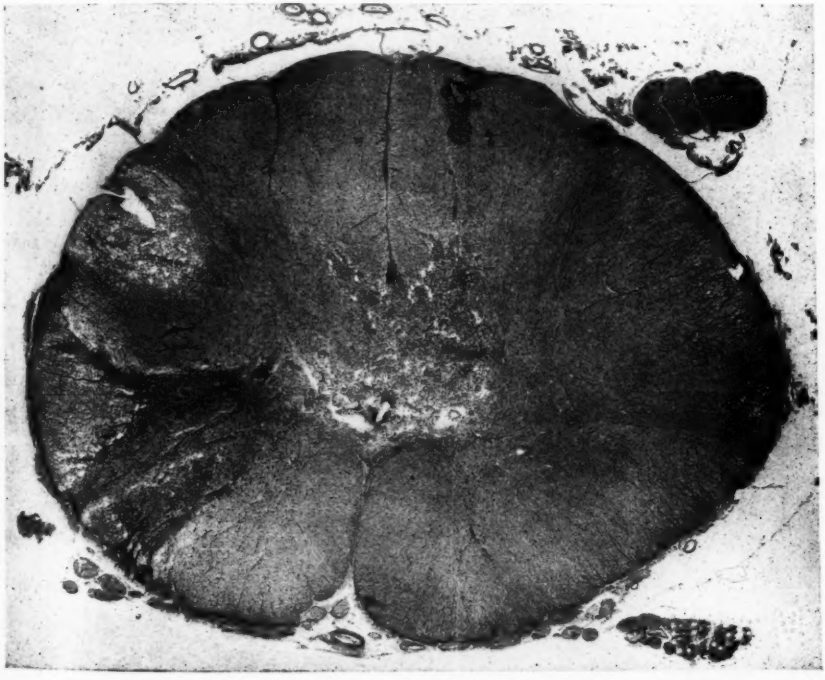

FIG. 4.—Cord at 1st dorsal vertebra. Central and marginal degenerations to the left.

In January the sight of the right eye began to fail and in two months vision was almost entirely lost. There was retention of urine and at times constipation. No headache or vomiting.

Status on admission:

The patient lay on his back unable to move his body except his head and shoulders. The arms were flexed, but he was able to extend the elbows and wrists. There was complete loss of power in the trunk and flaccid paralysis of the legs. There was slight blunting of sensibility below the level of the fourth dorsal vertebra. The cranial nerves were not involved, with the exception of the optic. The abdominal reflexes were present. The knee- and ankle-jerks were absent. Babinski positive; Oppenheim positive right and left.

Eyes: Corneal sensibility normal. Pupils 5*mm* each in diameter, irregular, light reaction wanting in the right. Mobility normal, no nystagmus, no history of diplopia. Vision of the right eye was perception of movement of hands; of the left eye V=$\frac{20}{20}$. For a candle the temporal half of the field for the right eye was complete, the entire nasal half was wanting, with a fairly sharp vertical line of demarcation between the two halves. The fields for white and colors were normal for the left eye.

The right optic disk was white and sharply outlined. The arteries were small, the veins were of normal calibre, some of them being slightly tortuous, suggesting a previous retrobulbar neuritis.

The patient's condition remained unchanged and he was discharged a month after admission.

An Ascending Myelitis Immediately Following Retrobulbar Neuritis in Both Eyes.

Case 4.—Mrs. M., aged 45, a housewife, was admitted to the Neurological Institute, in the service of Dr. Bailey, December 20, 1910.

She had been well, except for insomnia, until December, 1910, when, after an unpleasant discussion, she became very nervous and required the services of a nurse. The sight became blurred after a sharp pain in the left eye, and the eye within two weeks became perfectly blind.

December 10, 1910, while walking, her knees gave way and she fell to the sidewalk. After this, burning and pricking were noticed in the right foot and leg, and the left leg became numb to the knee. She fell on successive days

after this until admitted to the Hospital, December 20, 1910.

Eyes: The corneal sensibility was reduced on the left side. Pupils right 5*mm*, left 4.5*mm*, both slightly irregular; light and convergence reactions good in each eye. Mobility normal, no nystagmus. Right vision = $\frac{20}{200}$; left, no perception of light. The right field for a 1*cm* white square and also for the hand was concentrically contracted to 15° from the fixation point in every meridian. All colors, 1*cm* square, were recognized for about 5° from the fixation point in every meridian.

The fundi were almost normal in appearance. There was a faint blurring of the margin of each disk, and the surrounding retina showed a trace of œdema. The vessels appeared to be normal.

The other cranial nerves were normal. There was anæsthesia of the legs and of the trunk up to the seventh cervical vertebra, with sensitiveness to pressure from the sixth to the third cervical vertebra. Sensibility and muscular power of the arms were normal, but the patient was unable to stand alone. The epigastric and abdominal reflexes were absent, the knee-jerks present. In the next few days there was severe shooting pain in the frontal and occipital regions and in various parts of the back. The patient was discharged December 23, 1910, and there is said to have been improvement in her condition since. There was no increase in temperature. The blood count revealed nothing abnormal. The urine was normal. Spinal fluid: one lymphocyte to the *cmm;* no globulin, Wassermann negative, bacterial culture negative.

Blood: Wassermann negative, bacterial culture negative.

Clinical Summary. An eye may become blind within a few days without fundus changes. Vision lost may be restored in part. Later, pallor of the disk, partial or total, may be found; the margins of the disk may be blurred, the veins may be tortuous, and the arteries may have thickened walls.

The field of vision in the three cases in which they could be determined were peculiar. In one there was excessive concentric contraction of the field with fair central vision, and in two there was hemianopia for certain test objects for one eye alone.

Pathological. Bielschowsky, in his monograph,[1] describes the pathological findings in the cords and optic nerves of four

[1] *Myelitis und Schnervenentzündung.* Karger, Berlin, 1901.

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FIG. 5.—Left half of Fig. 4, showing infiltrations about the vessels.

patients dead of this disease, and concludes that a noxious agent in the blood produces focal changes in both the parenchyma and the interstitial substance of the cord. There were scattered foci of softening, with infiltrations about individual vessels running into these foci. In the optic nerves in some cases he found foci of degeneration along certain vessels of the nerve while the pial sheath was normal. In other more advanced cases there were breaking down of the nerve fibres, increase in the septa, increase in glia cells, with the presence of fatty granular cells and cellular infiltrations along the vessels.

The pathological changes found in the cords of Cases 1 and 2, described above, are well shown in a series of photographs of sections. Figure 1 (Case 2) is from a section at the level of the sixth cervical vertebra, seen from behind, with the ventral side below, stained with hematoxylin-eosin. It shows a degeneration of the gray matter and lateral columns of the right side of the cord, in the latter areas extending in a dorsal and a ventral tongue to the pial sheath. In the degenerated area the blood-vessels are surrounded by cellular infiltrations. The pial sheath is but slightly infiltrated here and there. Figure 2 is an enlargement of the section at point A shown in Figure 1. At this point the pial vessels are surrounded by cellular infiltrations. In the cord there is degeneration of the nerve elements with glial overgrowth, many spider cells being present, and in certain areas there are numbers of gitter or fatty granular cells. Figure 3 represents a higher magnification of the point B in Figure 1, showing vessels surrounded by cellular infiltrations running into the area of degeneration.

Lower down in the cord we find a different arrangement of the softened areas. Figure 4 is from a section at the level of the first dorsal vertebra. It shows a central degeneration with one ventral tongue extending to the pia on the left side of the cord and a dorsal marginal area of degeneration. The dorsal marginal area contains vessels with slight infiltrations about them, and there are present a few spider cells and a few fatty granular cells. The tissue is greatly rarified, as is the tissue bordering the large areas in which the degenerative process is active and the fatty granular cells are abundant. Figure 5 represents a greater magnification of the left portion of the section shown in Figure 4. In this are clearly seen the infiltrations about the vessels running from the pial sheath inward to the area of degeneration.

The conditions found in the cord of Case 1 were very similar. Figure 6 is from a section about the level of the fifth cervical vertebra. It shows an extensive central area of softening similar to those found in the other cord except for the fact that many hemorrhages are present. The vessels running from the pial sheath to the softened area are surrounded by cellular infiltrations. The destruction of nerve tissue is less marked than in Case 2, and the Marchi reaction is not pronounced. Sharlach R. shows the granular cells to be filled with fat globules. Figure 7 represents a higher magnification of the softened area, showing two vessels cut transversely, with excessive cellular infiltration about them. Many fatty granular cells are present and there are a number of broken-down red blood corpuscles.

In these two cases there would seem to have been a noxious agent in the blood, which destroyed the parenchymatous elements of the cord and also damaged the vessels supplying the affected parts, and we are justified in assuming that a similar process occurred in the affected optic nerves.

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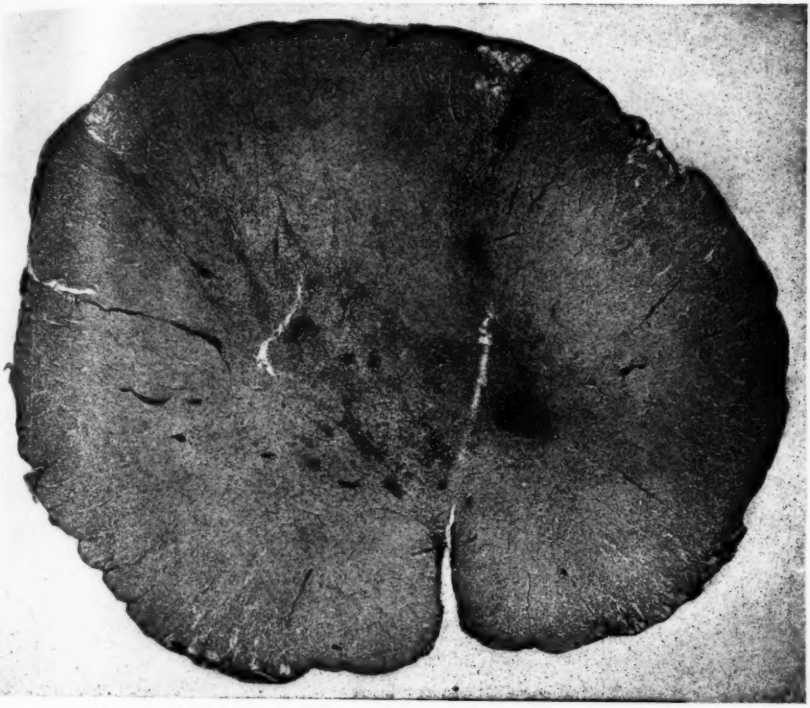


FIG. 6.—Cord of Case 1, at fifth cervical vertebra. Large central softening.

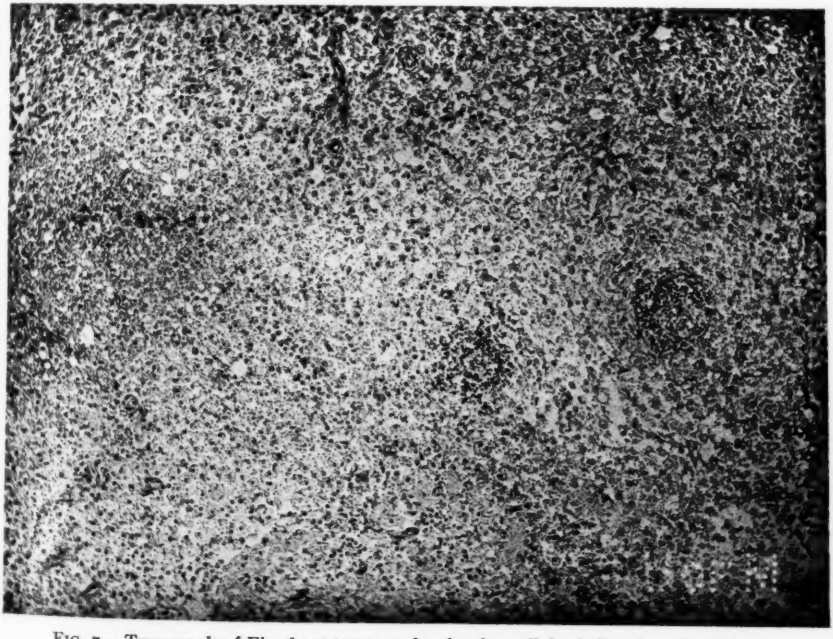


FIG. 7.—Two vessels of Fig. 6 cut transversely, showing cellular infiltrations about them.

INTRACAPSULAR EXTRACTION OF THE CATARACTOUS LENS.[1]

By Dr. ROBERT SATTLER, Cincinnati, Ohio.

THE Von Graefe method of modified linear extraction in its present perfected form has given general satisfaction and has deservedly become an almost universal practice. It assumes that the most opportune time for the delivery of the cataractous lens is at or during a relatively advanced or mature stage of its progress. The opening incision and iridectomy are its cardinal features and have the unqualified approval of common experience; but the means for delivery of the lens by opening the capsule and expressing its contents, leaving a more or less torn and not always empty capsule in the eye, have remained its weak and objectionable points.

What may be said hereafter must not be construed as an expression of disappointment either with the visual results obtained or with the technical execution of the operative sequence of the modern method of linear extraction of senile cataract.

A larger series of consecutive extractions made after this method, only, during the last ten years, would conclusively refute this, and would rather emphatically confirm what is generally admitted, that for the average ophthalmic surgeon, and certainly so far as my own personal experience bears out, it has been eminently satisfactory, and for this reason is justly preferred on its own merits of safety and facility of technic.

This experience also supports the commonly accepted statement that total failures have been reduced to two per cent.,

[1] Read at meeting of American Ophthalmological Society, New London, Conn., July, 1911.

but adds an additional two per cent. loss, and in one series of one hundred even one half per cent. more or higher following subsequent capsulotomy, iridotomy, etc. It furthermore discloses that it was a complete or final first success in twenty to thirty per cent. only, or in which subsequent surgery was not necessary, while for the larger remaining portion capsulotomy, iridotomy, iridectomy, etc., were indispensably necessary before a final success was achieved. It abundantly confirms known and admitted facts: foremost among these, that it is impossible even for those with larger experience, sharpest vision and manual skill, to determine with certainty that a capsule which has been opened with cystotome or forceps has been completely emptied of its contents at the accepted finish of the operation; also that greater risks and almost certain post-operative complications can be looked for in those cases of immature cataract interminably slow to advance in their earlier and later stages and to hasten which so-called artificial ripening and preliminary iridectomy are advised and practised. In such cases, as is well known even with the most favorable conditions at the time of final extraction, a tedious recovery, almost certain post-operative surgery, and unsatisfactory restoration of vision are depressing disclosures which my experience also reaffirms. Also that for certain clinical expressions of senile cataract, thickening of the anterior capsule with precipitates on one or both capsular surfaces, and also, but not until recently so well known to me, of the equatorial zone, the result of senility, general and local arterio-sclerosis and former low-grade expressions of uveitis, etc., extraction by capsule laceration and expression is positively unsafe and unjustifiable. For these cases removal in capsule can alone avert certain failure. For such cases until recently but one of two courses was open to us, either to extract by the linear method and take the chances that the complications certain to follow could be rectified by repeated post-operative interference, or to resort at once to the only other expedient, rupture of the hyaloid and the use of the vectis or skeleton spoon. The latter is the plan I have followed, but successful extraction is not always possible by this means without bursting and retention of the capsule, if the zonular attachment is firm and offers greater resistance to or eludes

the skeleton spoon, at best difficult to manage, if lens and capsule are to be removed jointly.

Concerning the most important point or question, the final restoration of useful vision after the dangers of operative interference are safely over and ability to read and resume occupation or professional work has been restored, the modified linear method has yielded me most satisfactory and numerous excellent results as well as its proportion of indifferent ones and failures. ***From a surgical point of view, I have never been able to overlook the objectionable consequence of capsular thickening and visible permanent opacity of the pupillary area found even in the most successful cases. Each cyclus of new cases in which even a minor post-operative interference of the opaque and thickened capsule is necessary is undertaken with a fuller understanding of its uncertainty and danger.***

This shortcoming from a surgical point of view, or rather the consequences which follow the technical execution of lens delivery as part of the modified linear method, and which the most ingenuous surgical skill and inventive talent have sought in vain to overcome, force us irresistibly to keep up our search for a possible means to avert these complications, one of which alone adds one or even two per cent. to the total loss of the first or major surgical interference of extraction by this method.

It was with this purpose in mind and to discover if possible whether delivery in capsule along wholly different and not before used surgical lines such as proposed by Col. Smith was practicable for our cases, that a series of investigations were begun. The earlier results were favorable, and this led to others on a larger scale, of which the following is a synopsis, and leads to the conclusion that it is safe and practicable for a share of our cases from choice and for a smaller one from choice certainly.

A safe successful means for extraction in capsule has until recently not been known nor ever been made even a possible or lasting part of the Von Graefe method or any other.

For the reason that the Smith method directs a new and different technical execution for lens delivery in capsule it deserves an impartial consideration and a fair trial.

The credit of having revived in us the hope of a possible safe extraction in capsule, belongs to Col. H. Smith now of Amritsar, India.

It is now known, and justly so, as the Smith or Smith Indian method, for until then all similar suggestions, even the one in question, practised for a much longer period by the Pagenstechers and their followers, for the delivery of the lens in capsule, were found wanting in safety and facility of technic, and were speedily and silently abandoned. The glamour which surrounded the first almost fabulous numerical accounts, together with the imperfect evolution of its technic, the vague and varied directions for the execution of its distinctively new feature, combined at first to deprive it of the recognition and consideration to which it was entitled for the following reason.

The lens delivery of the Smith Indian method is radically different from all former ones. It disposes of lens and capsule in one movement. If successful it eliminates permanently the dread and danger of post-operative surgery which is necessary in more than one half of the successful extractions after the linear method. This alone should afford it an impartial trial. It points out also a long-sought technical deftness and new instrument, with instructions which can be safely followed by any trained and calm ophthalmic surgeon, as well as by those of larger experience and specially acquired skill. It cannot be considered a rival method, for it claims only to accomplish in a safer way the same purpose of lens delivery, but as part of a different technic. The visual results are as perfect, further surgery is unnecessary, and it is a first or final success.

Against it are admitted objections, some purely speculative as to what becomes of the posterior capsule as support for the iris, and the tangible ones of imminent and greater loss of vitreous, an ovoid, drawn-up pupil, opacification and punctation of the hyaloid envelope, but neither one nor all are any more certain consequences than that thickening of the capsule or retained corticalis, its opacification and swelling, must happen in every case after capsule laceration and expression with the modified linear method.

As a new method, that of Col. Smith did not at first attract me. To again transfer the opening incision to the clear cornea

and without a flap of bulbar conjunctiva, upset all my cherished and confirmed convictions of greater security for the patient and facility and safety of extraction.

The iridectomy also had from the first my disapproval. It was unsurgical in its execution and incomplete so far as making it a clean excision with convergent or divergent limbs reaching to the periphery of the iris. It appeared to me at that time, and does so at present after a larger practical experience, that the iridectomy is a weak or objectionable feature of the new method. Much of the disapproval urged against it, that an ovoid, drawn-up pupil, which is so common an attendant even of a successful extraction by this method, is a necessary sequence of too small and too hasty an excision of the iris, often embracing only its pupillary border or a triangular slit with its base toward the pupillary border. It is claimed by Col. Smith "that, to avoid the introduction of the iris forceps into the eye, the iris should be made to prolapse by gentle pressure with the closed forceps against the outer wound margin, and with light pressure only a small knuckle of iris made to prolapse, which is quickly abscised." With the exception of doing this in a few first cases, I have not followed this suggestion since or in the larger number of cases which followed.

For the reason that the distinctive feature of the Smith method, namely, lens delivery in its intact capsule, was not for a long time fully understood by me even after a thorough study of Col. Smith's publications, accounts of his visit to New York and his personal demonstrations there, and other sources of information as well, I was nevertheless convinced, even with inadequate appreciation of its technical execution and with limited trials, that it merited more careful investigation. Now that experience has added a larger number of cases, Col. Smith in his book has more specifically explained it, and my associate, Dr. Clarence King, after a personal visit to Col. Smith's clinic, has given me additional and more exact information, a brief description of the technical execution of the cardinal feature of lens delivery in capsule by the Smith method as I now interpret and practise it, may convey a fuller meaning.

Let us assume that incision and iridectomy have satisfactorily preceded it. After a brief interval, the upper lid is

securely held with a blunt hook in the right hand and the lower lid with the fingers of the left one of an assistant, whose manual dexterity, good judgment, and knowledge of every possible happening during and after its execution enable him to control even the voluntary or other contractions of the lid muscles. This should afford an unobstructed though deep view of the field of operation, with unobstructed freedom to begin the pressure movements which, if successfully carried out, effect the expulsion of the lens in its intact capsule. This pressure is exerted through the medium of a large blunt or rounded strabismus hook, *over a limited area of the cornea, not much larger than its point and near the lower border or even slightly beyond or below it.*

It is sufficiently firm from the first. It must not become continuous in force or definite in direction until one is certain that the equatorial ridge of the lens can be distinctly felt through the indented groove of the cornea at this point. It is this indentation of the cornea and the ability to fold it around the equatorial ridge of the lens which enables the operator, through pressure carefully and firmly applied at the point mentioned, to rupture the zonular attachment above or below. That this has happened will become evident at once. If it is ruptured above, the now continuous pressure directly backwards will force or tilt the upper equatorial zone of the lens into the wound which it fills, and the operator must hold it there until he is convinced that the zonular detachment is complete. At the finish, its final exit may be assisted by gentle tapping or by scooping the now extruded lens with the hollow or concave portion of the hook now used for this purpose. If the zonula ruptures below, either accidentally or because the lens is tumescent or because it is the intention of the operator, the lens will rotate or tumble and will even more completely fill the wound, and must be kept or held there by the operator until the zonular attachment is fully torn above. The detachment of the zonula will be the reverse of the former and will first occur below. In other words, delivery of the lens is accomplished wholly through a cultivated touch, which can be acquired only by experience, differing from the similar ones practised for capsule opening and expression in so far as concentration and direction of pressure and a new instrument

are concerned. If one ignores the fact that it is absolutely necessary to feel, through the medium of the point of the blunt hook, the lower region of the lens border, indent and embrace it with a rounded depression of cornea, and only when this is a certainty lift it and follow it up with the necessary pressure, he will fail in his effort to deliver the lens in capsule or must be prepared to face complications.

Fifty consecutive unselected cases of cataract furnished me with the answers to the following queries, besides other information which will be briefly stated.

1. Is delivery in capsule with Smith's technical execution desirable, and can it be made a practical substitute or replace the similar one of the linear method, while retaining in every particular the distinctive features (incision, iridectomy, etc.) of the latter?

2. If successfully accomplished, how does it compare in visual results, complications during and after such an attempt, with capsule laceration and expression of the older method and its complications and immediate and remote visual results?

3. An impartial comparison of a successful extraction with capsule opening and expression of one eye and a successful intracapsular operation on the other eye in the same subject.

4. How to gain a more accurate and practical knowledge to guide us in the selection of cases for which intracapsular removal for evident reasons is superior, and the uncommon cases for which it is alone justified or contra-indicated.

Long before twenty-five extractions had been made with delivery in capsule, from choice as part of the sequence of the older method, it was conclusively established that this could be done. At the same time a stronger conviction of its inexpediency and unjustifiability was forced upon me, for neither experience, skill, nor foresight could overcome the unnecessary risks and complications which such an attempt involved and precipitated. In the first twenty-five cases

rupture of the hyaloid was ever imminent. It happened to me seven times, once with capsular retention. In three I failed completely to deliver the lens in capsule and, as rupture of hyaloid had not taken place, resorted to the cystotome and expression. Thirteen of the twenty-five made perfect recoveries. Eight of these could be classed as exceptionally perfect, in so far as vision for distance and near was concerned, as well as a speedy, painless, and uncomplicated healing.

Five of the remaining twelve had drawn-up pupils, but not sufficiently so as to interfere with vision or to require subsequent surgery. The rest made incomplete surgical but satisfactory visual recoveries. The lowest vision resulting was 0.3. There was no casualty.

For the remaining twenty-five, I had adopted Smith's method. I confess to having taken some license with the iridectomy: whenever possible, a preliminary one was made and, this impossible, the iris excision was not a notching or a triangular rent of the pupillary border, but with clean and free limbs to its periphery. This series included cases of exceptional responsibility: Two cases in younger subjects, forty-four and forty-nine. Both had lost one eye, the result of a former injury. Both were infirm in consequence of slowly increasing loss of vision, eager and insistent that something should be done. In both the lens was swollen, the opacity not striated but blotchy, with unmistakable capsular thickening and pathologic punctation of its inner surface; there were semi-transparent and many perfectly clear areas through which the fundus oculi could be seen, and vision was reduced to less than 0.2 in the first case and to 0.1 in the second. A preliminary iridectomy was made in the first case, and in the second it was refused. The lens in both was extracted in capsule without accident, and the eyes rapidly restored to exceptionally perfect usefulness with no possible dread of post-operative consequences. Both have at present full normal vision; have resumed their former occupations without interruption.

A linear extraction two and one half years before, followed by a capsulotomy, with perfect restoration of vision for distance and near on another patient who was well informed as to the merits of the various methods of extraction and favored

an extraction in capsule of his remaining eye. He had a tumescent lens and much semi-transparent tissue. A preliminary iridectomy was made and three months later an attempt to extract the lens in capsule. The capsule ruptured but was extracted with much loss of vitreous. Healing was slow and this eye was as great a failure as the other eye was a success, certainly from a surgical point of view, even though he has 0.4 vision after the last operation.

Two cases which now followed were both of women past sixty-five but in good general health. Both had high axial myopia during early life and now slowly advancing lenticular sclerosis. The first had one amblyopic eye in consequence of detachment of the retina and extensive uveitis. An iridectomy had apparently arrested the pathologic changes. The eye was blind, but free from all irritation or pain. The other cataractous eye appeared functionally not unfavorable for an extraction, except that the lens was swollen and the capsule studded with glistening crystals, calcareous or cholesterine. The dense capsule and the sclerosed but very large lens suggested intracapsular removal as the best and only expedient, and it was done without accident and with excellent result after an uneventful recovery. The other case, delivery in capsule, preceded by an iridectomy three months before, was complicated. The lens was sclerosed, semi-translucent, and had a very dark nucleus. The capsule was ruptured and retained, a large amount of vitreous was lost, but the lens was removed with the skeleton spoon. In spite of these disastrous complications the patient recovered with an ectatic wound with much incarceration of iris and capsule. Four months subsequently an iridotomy was done and vision 0.3 restored without a lens. Of course this case can only be considered a failure. Of the later cases, a man, æt. seventy-eight, of feeble general health, with a hard sclerosed lens, great capsular thickening, and concretional deposits. The other eye was hopeless. Intracapsular delivery was done without difficulty, but with slight loss of vitreous and an adherent zonula. Even the equatorial regions of this lens were found studded with the concretional, colloid, or calcareous deposits. Total loss followed this attempt.

An almost hopeless outlook in another case of a man upon

whom, seventeen years previously, double iridectomy for acute glaucoma had been done, but in which functional tests still justified or rather commanded interference. One eye was hopeless, the other had a central darker opacity, but the entire lens was sclerosed and dark amber in color, and the capsule, under high magnification, was full of punctated thickened areas. The lens was removed in capsule and was huge in proportion and thickness. Capsule opening and expression in this case would not have been justifiable. It is true that much vision was not recovered, but an absolutely uncomplicated painless recovery followed. The series includes further one additional total failure, but this not to be attributed to the attempt at intracapsular delivery, for the eye was lost before this was accomplished. The patient, who was a neuropathic subject seventy-six years old with pronounced arterio-sclerosis, became uncontrollable when the incision for a preliminary iridectomy had hardly been completed, squeezed the speculum, and extruded the contents of the globe. A general anæsthetic and removal of the eye, the only safeguard against a lengthy recovery, was promptly advised and carried out.

Another uncommon experience was afforded by a woman aged sixty-eight, who had great apprehension that the operation would not prove successful. The eye had a sclerosed centrally opaque lens, but she was able to go about without assistance in her own home. There was little or no progress in the lenticular opacity after a preliminary iridectomy fourteen months previous. I was loth to advise the operation and she was eager to defer it, but finally became intolerant of her helplessness and submitted. The other eye had cataracta accreta, firm iris synechiæ, V=0. The eye for operation had a thickened capsule which the iridectomy had uncovered and enabled us to make out most satisfactorily. The case was certainly one for which intracapsular removal afforded the best and only chance for success. It was done without loss of vitreous. The lens was very large with capsular deposits on both but in particular on its posterior surface. No reaction of any kind. On the third day a visual test was made. She was found totally blind, not even able to distinguish movements of the hand and had only an uncertain light perception.

As already stated there was nothing to indicate infection or other complication. The ophthalmoscope disclosed absolutely clear media and the fundus presented an appearance so startling that at first we thought an unsuspected intra-ocular neoplasm had been uncovered by the operation. More careful observation established that it was an extensive detachment of the choroid. For six days this truly wonderful ophthalmoscopic picture lasted, then slowly receded under no treatment, and the patient was dismissed three weeks afterward with vision 0.1, which during the interval of one year has increased to 0.5 with ability to read ordinary print. No trace of the former extensive detachment of the choroid can be discovered.

I mention these cases only to prove that a fair test was accorded the Smith method, after the manner we practised it, with the best information that could at that time be obtained for its technical execution. Let me add that in most of these cases the pressure movements to deliver the lens were not confined, as at present advocated and practised, to a limited area, but with the same purpose to get the point of the hook under the lens border and lift and follow it up with strokings until the lens was delivered, but applied over a larger area of the cornea.

The practical information furnished by the entire series of cases was conclusive on one point, that intracapsular delivery after Smith's execution cannot be made a ready or safe part or substitute of the older method as commonly practised. If with the old method it is impossible to extract after capsule opening and expression, the vectis or skeleton spoon is the best and safest expedient to effect its removal. All other means including Smith's are inferior and uncertain.

If the indications are plain for removal in capsule and it is selected as the most rational, the safest technical execution to effect it is the method proposed and practised so extensively by Col. Henry Smith. The opening incision wholly in the cornea, the knife entered at an angle of sixty degrees more or less to the equatorial plane. If successfully carried out, it is a more brilliant achievement from a surgical point of view than the best that can be obtained fron the linear method. It has an unparalleled numerical record in India, but time and our own experience only can prove to us whether it will

combine safety and uniformity of success such as has unquestionably been established and is almost certain for the average surgeon with the older method, which until a few years ago was almost a universal one.

Permit me in conclusion to state concisely the final practical points.

First, that intracapsular extraction has its limitations, and that the calmest judgment must direct a disinterested and impartial choice in the selection of cases.

Second, that rarefaction with brittleness of the zonula is a senile change long known and accepted, but that its easy rupture through certain pressure movements against the outside of the globe is possible, is a new fact and an important disclosure of the Smith method.

It is selected by me from choice in those cases in which I can distinctly make out *the presence of a swollen or rounded lens, with additional objective proof that the equatorial regions are not too angular.* The depth of the anterior chamber, retraction of the periphery of the iris, and preliminary iridectomy are the principal means to determine this. If capsular thickening is present, it is an additional reason for its choice. *The age period which I found most favorable for delivery in capsule, with the conditions just mentioned present, was between fifty and sixty.* For Morgagnian cataract with capsular thickening I have also found that it affords a safer and readier means to extract in capsule.

For a larger contingent I would use the older method from choice and experience, and select accordingly. These cases include in particular those of slowly advancing lenticular sclerosis or desiccation in older subjects or those past sixty-five, but even under this age period, if the same advanced lenticular senile changes are present; but I must be able to prove the absence of capsular thickening or opacity. If in addition it can be assumed that the lens is shrunken and hard throughout, dark yellowish or brownish black in color, semi-translucent, flat on its surfaces and angular at its periphery or equator, *capsule opening and expression accomplish the purpose of lens delivery with lesser risk and greater ease.*

I also believe that it is the safer method for extraction in younger subjects around the age of forty-five who with other evidence of pre-senility develop cataract, which advances more rapidly to complete opacity with waxy texture, and the lens flat and inelastic often with capsular thickening and adhesion. The same changes occur as in older subjects, only *are* more rapidly enacted and attended by greater shrinkage of lens and wrinkling of capsule. For these cases I have also found it best not to attempt again intracapsular removal, but to rely on the old method, with the vectis as an expedient for final delivery.

In general, the cases most favorable for intracapsular removal are those with lenses that have not undergone too great shrinkage in size and increase in hardness, and which retain an approach to the globular or swollen type and whose equatorial regions are yet rounded. It is less important whether they have reached an immature or a later stage or whether they show slow or more rapid progress. ***Once angular at the equator, flat at the poles, the lens is too securely fixed in the hyaloid fossa which makes its displacement not only difficult but in many cases impossible.***

I have found also that it is inexpedient for those rare cases in which the lens appears puffy, the corticalis swollen, opaque, and asbestos-like, or which show the very opposite of desiccation, and in which rupture of the capsule is imminent or certain. In order to remove such lenses in capsule, they must be made to tumble or rotate, but it remains an open question whether capsule laceration and expression is not safer and preferable.

The following seven belong to a smaller group of cases of the entire series, in which a successful linear extraction had been done in one eye and extraction in capsule in the second eye, and the patients all restored to usefulness with the ability to read and write and to resume their accustomed occupations through the first operation. Two cases had full vision for distance and near. In four this was brought about only by repeated capsulotomies. The fifth had noticed, only during the last two years, a gradual failure of vision in consequence of capsular thickening. He refused further operation on this eye but was willing to have the other eye operated on.

Linear Extraction	*Extraction in Capsule.*
Case I. Woman, æt. 59. Operation six years ago. V. 0.7. Two capsulotomies. Has thickened and opaque capsule but clear central area.	Complete operation, uncomplicated delivery. Leakage of the wound for seven days. No incarceration. V. 0.9. Visual and surgical results incomparably more favorable than fellow eye.
Case II. Woman, æt. 62. Operation two and a half years ago. Eye diverged; lens hypermature; capsule thick. Uneventful recovery. V. 0.4. Dense capsular opacity and thickening.	Preliminary iridectomy. Extraction in capsule without accident. V. 0.7. Reads finest print with corrective lenses. Healing uneventful; no iritis and at no time indication for treatment. Surgically and visually greater success than fellow eye.
Case III. Man, æt. 67. Operation three years ago. This eye had iridodialysis from blow, but functionally sound otherwise. Lens hypermature: capsule not thickened. V. 0.8 for distance and full normal for reading with corrective lenses. Uneventful recovery, but two capsulotomies necessary to restore present vision.	Preliminary iridectomy. Extraction in capsule: rupture and retention of capsule. Large loss of vitreous. Final recovery with drawn-up pupil, cystoid scar of incision. From surgical point of view, complete failure. Final recovery of 0.3 vision, but which, owing to the perfect state of the other eye is impracticable. Incomparably in favor of the first eye.
Case IV. Man, æt. 71. Operation eleven years ago. Until two years ago was able to read satisfactorily with lenses, and distance vision was equally perfect. V. 0.3, but has dense capsule and needs discission operation.	Preliminary iridectomy. Extraction in capsule without accident. Absolutely painless and rapid healing. Vision 0.8. Incomparably more favorable both from a visual and surgical point of view.
Case V. Woman, æt. 79. Operation thirteen years ago. Has V. 0.4 in spite of iris adhesion, dense and opaque capsule. Two capsulotomies.	Complete operation. Delivery of lens in capsule, without accident, but extremely tedious as lens was flat and hard. Uneventful healing except hazy cornea from pressure, but pupil drawn up and eye invaded by a low grade of uveitis. Final recovery. V. 0.1. Refused iridectomy on account of her age. Visionally a failure without an iridectomy, surgically equally so.

In two cases an extraction in capsule on the first eye and a subsequent linear extraction on the other. In the first one it was unsuccessful, even though a subsequent iridectomy restored 0.3 vision. The lens of the eye was extracted by the linear method, preceded by preliminary iridectomy, with restoration of 0.5 vision, but will require subsequent surgery as

capsular thickening is in progress. In the second case intracapsular removal of the first eye was attended by bursting of capsule and its retention, but after a tedious recovery and excessively bad surgical result he had 0.3 vision. The lens of the other eye was extracted by linear method, followed by tedious recovery owing to retention of corticalis, dense capsular thickening, secondary glaucoma. An iridectomy controlled but could not avert what can only be considered a failure surgically and visually.

I now advise and practise preliminary iridectomy and insist upon it in every case in which I decide upon an intracapsular operation.

It must be added that in the selection of suitable cases for extraction in capsule of the last fifty cases, sixteen only were intracapsular. The rest were linear extractions and many of the latter were very disappointing owing to the necessity of post-operative surgery. My excess of caution must be attributed to the experience gained from the first fifty and an equal desire to fairly match and test the linear method. The total loss of the one hundred cases was one per cent., with additional one per cent. equivalent to a loss but with preservation of the globe and vision less than 0.1. The perfect intracapsular recoveries compared more favorably with the perfect ones of the linear method because of their absolutely clear pupillary area and the absence of the necessity of additional surgery. The partial successes of the intracapsular compared as favorably with the similar ones of the older method.

Again let me add that he who attempts to extract in capsule after the Smith method must keep in mind that the pressure movements against the cornea must make of the vitreous and its elastic envelope a cushion, of the upper overhanging wound of the cornea, a support or buttress against which, if the elasticity of the globe and the resistance of the hyaloid can be counted upon, rupture of the zonula will take place, followed speedily by the delivery of the lens in its unbroken capsule.

The series of fifty additional cases has been reduced through the fairest exercise of selection of one intracapsular extraction to three of the modified linear one. This is neither for nor against one or the other, but is rather a confirmation of the

fact that both are entitled to equal recognition and trial, and that for some cases, as those mentioned, the older method offers the safest and most facile means, and for others, the intra-capsular method after Smith is not only the best but the only justifiable one.

THE USE OF SERUM IN SYMPATHETIC OPHTHALMIA.[1]

By GEORGE S. DERBY, M.D., Boston, and HORATIO N. PRATT, M.D., Louisville.

(With one chart.)

OUR attention was drawn to the possibility of using serum injections in sympathetic ophthalmia by the article published by Zur Nedden in 1906.[2] Zur Nedden's case was as follows:

> A twelve-year-old girl had met with a long perforating injury which went through the left cornea and sclera into the iris and lens. The wound healed well; yet, as there remained a considerable inflammation of the eye, enucleation was advised, but not consented to by the parents. One month after the injury there was photophobia of the sound eye, soon followed by a well-marked irido-cyclitis. The exciting eye was then removed, but the condition of the second eye continued to get worse in spite of all treatment, and the vision sank to $\frac{1}{4}$. The use of mercury, atropin, and cupping had no effect.
>
> About twleve weeks after the onset of the sympathetic inflammation, 20*cc* of serum obtained from a patient (for a month this patient had had no ocular inflammation) shortly before blinded by sympathetic disease, was injected subcutaneously. The success of this procedure was surprising. The change in the patient's condition came so promptly and was so marked following the serum injection that Zur Nedden

[1] Read at meeting of American Ophthalmological Society, New London, Conn., July, 1911.

[2] Zur Nedden: "Bakteriologische Untersuchungen bei sympathische Ophthalmie," etc. *Archiv für Ophthalmologie*, vol. lxii., p. 193.

did not regard it as an accident but rather as a proof that shortly after the termination of a sympathetic inflammation the patient's blood contains antibodies, and if a quantity of it be injected into a second patient suffering from the same disease, his cure may be assisted.

In addition to this case we have been able to find in the literature a short statement by Brons from the Freiburg Clinic to the effect that Zur Nedden's procedure had been tried there on two cases of sympathetic ophthalmia without any degree of success.

Outside of these three cases we have been unable to find any further references in the literature.

On March 25, 1910, Thomas Hurd, 29 years old, came to the Mass. Charitable Eye and Ear Infirmary with an injury of the left eye and cuts of the face caused by the explosion of a bottle charged with gas. According to the record made at that time, there was an incised wound of the cornea extending across its entire surface and a slight wound of the iris beneath. He was advised to remain in the Hospital but refused.

On May 7th he returned and according to his story the injured eye had quieted down in about five weeks. During the previous ten days, however, the good eye had been somewhat sensitive to light and for two days it had been red and painful.

Examination of the left eye showed marked injection, the scar of the corneal wound running diagonally across the cornea, beginning just above the limbus superiorly and ending just below the limbus inferiorly. The iris was in contact with the posterior surface of the cornea; the pupil, displaced down and out, did not react to light nor dilate under atropin. The lens was opaque. Vision equalled hand movements close to the eye. Light perception and projection good.

The right eye (previously healthy) was markedly injected, very sensitive to light, and tender to the touch. There were many fine and a few large precipitates on the posterior surface of the cornea, the aqueous was turbid, the iris discolored, the pupil small and irregular with a little exudate along its margin. The lens was fairly clear, the vitreous slightly hazy. Vision $= \frac{20}{70}$. In short, there was a well-marked irido-cyclitis.

The patient was admitted to the hospital on the service of Dr. E. E. Jack, through whose kindness we were allowed to treat the case with serum and to report it. He was

placed in a dark room, and given mercurial inunctions twice a day, massive doses of salicylates, atropin every two hours, hot fomentations, etc.

On May 8th, there was no change in his condition, except that he was having an increased amount of pain particularly at night. There was a very slight amount of dilatation of the pupil upward. It was determined to try the effect of serum, as we had the following suitable case in the hospital.

Harlan Young, 33 years old, entered the Infirmary, Feb. 16, 1910, with a shrunken right globe resulting from a perforating injury three months previously. He had had pain in the globe for three weeks previously and photophobia.

Enucleation was performed, and he was discharged well on February 21st. At that time the left eye was normal with a vision of $\frac{20}{20}$.

About the middle of March, the left eye became red and slightly painful, and his symptoms have increased since then.

He came to the hospital on April 1st. Examination showed marked injection, cornea slightly hazy, with a few precipitates on the posterior surface of the cornea. The iris was muddy, the pupil well dilated, and the lens clear. There was considerable pain.

The patient showed a gradual improvement, and on May 9th, at the time the first serum was taken, the eye was quiet, but there were still a few precipitates.

The pathological examination showed an atrophied eyeball with very marked recent inflammatory changes. The picture of sympathetic ophthalmia was not typical, not improbably on account of the recent fresh inflammation.

An absolutely positive diagnosis of sympathetic ophthalmia cannot be made in this case from the pathological examination, but the history and clinical picture were typical, while the pathological examination was not inconsistent with it.

TECHNIQUE OF BLOOD WITHDRAWAL

The serum was obtained from this patient by puncturing the superficial veins of the arm and drawing the blood into a Record syringe of 20*cc* capacity.

Ordinary aseptic precautions were observed, and a tourniquet was applied above the elbow. For one unaccustomed to the precedure the technique is not easy, since a very considerable quantity of blood must be obtained. In several

instances we had difficulty in entering the vein on account of its small size. Too large a syringe may not be used as it is unwieldy. Too large a needle will not enter the vein, and with a snall needle it is difficult to avoid clotting, which will obstruct its lumen. We had trouble with several Record syringes in that when heated up to body temperature the metal piston was exceedingly likely to jam in the glass barrel, and unless cleaned immediately after use it would stick badly.

Roughly to obtain a stated dose of serum, it was necessary to withdraw twice as much blood. For 30*cc* of serum we had to take 60*cc* of blood, and this necessitated several punctures as it was rarely possible to obtain more than the capacity of the syringe (20*cc*) at one puncture on account of clotting in the needle. After the blood had been emptied from the syringe into a sterile jar, we found it necessary to clean it at once in a jar of sterile water kept cold in an ice bath. On one occasion, being dissatisfied by these methods, the blood was obtained for us by Dr. Beth Vincent by a blood transfusion technique modified by him. A moderate-size vein was laid bare at the bend of the elbow under cocaine anæsthesia. It was cut across, and a small glass tube coated with a special mixture of paraffin and stearin was inserted into one end, and no difficulty was found in securing 100*cc* of blood. Out thanks are due to Dr. Vincent.

The difficulty in this procedure lies mostly in getting the consent of the patient, especially when blood has to be secured on several different occasions.

The blood obtained was run into a sterile jar, and placed in the ice chest for twenty-four hours, at the end of which time the serum was drawn off and injected subcutaneously between the shoulders.

May 9th, Hurd was given 23*cc* of serum from Young.

On May 10th, 48 hours later, there was a very considerable change in the condition of the right eye. The pupil had begun to dilate, the injection had nearly disappeared. The vision continued at $\frac{20}{70}$.

May 11th. The pupil was moderately dilated and nearly round; only a slight trace of injection remained. The iris was less muddy. There were many precipitates on the

posterior surface of the cornea, and a number of small black pigment spots could be seen on the anterior surface of the lens where the iris had pulled away. Ciliary tenderness had disappeared. The vision had risen from $\frac{20}{70}$ to $\frac{20}{30}$. Tension normal. In short, within the 72 hours following the injection there had been a remarkable change for the better in the condition.

On May 12th, the salicylates were omitted, as the patient was continually nauseated and could not eat.

The eye continued in the same condition until May 15th. There was a slight increase in the injection of the eye, and on the next day the vision decreased from $\frac{20}{30}$ to $\frac{20}{40}$. The injection then became more marked, and on the 18th, ten days after the first serum injection, a second was given, 30*cc* being administered.

May 19th. V. O. D. $\frac{20}{200}$. Marked ciliary redness, pupil getting smaller. Tenderness to the touch had re-appeared. The left eye was then enucleated, as the projection in the upper field had become faulty.

May 20th. Much less redness of the eye. Pupil fully dilated. Vision improved to $\frac{20}{70}$.

May 24th. Eye white. No Descemetitis to be seen. Pupil fully dilated. No photophobia. V.O.D. $= \frac{20}{30}$. Salicylate of soda, 15*gr* every two hours during the day, was again ordered; large doses of mercury were also being used.

In spite of this treatment, on May 27th the first signs of another recurrence began to appear, and by June 2d, five days later, in spite of energetic treatment, the eye was very red, cornea hazy, pupil only half dilated, and iris discolored. Patient's mouth was sore and his stomach upset. The mercury and salicylates were omitted and 20*cc* of the same serum was injected. At this time the eye was in the worst condition it had been in at all; the pupil was closing down and the vision had sunk to $\frac{20}{200}$.

Following this injection the redness and photophobia began in two days to disappear and the pupil again responded to atropin. Owing, however, to increased vitreous cloudiness the vision continued to sink for four days, reaching its lowest point $\frac{2}{200}$ on June 6th. Then it began to rise rapidly, as the vitreous haze cleared, and on June 8th it was back at $\frac{20}{70}$.

It seemed at this time probable that the serum was efficient in temporarily overcoming the disease, but its action was limited as to time. As we could not obtain more of it at this time, we injected 6000 units of diphtheria antitoxin. The vision continued at $\frac{20}{70}$, and the eye remained white until June 16th.

June 19th another recurrence began. Moderate redness,

photophobia, pupil decreasing in size. V. O. D. = $\frac{10}{200}$. Tension slightly increased, pain at night.

June 22d. Vision = fingers at six feet. 30*cc* of the same serum were then given. Two days later inprovement noticed.

June 26th. V. O. D. $\frac{20}{200}$. June 29th, V. O. D. = $\frac{20}{70}$. Eye white and quiet.

July 12th. Another recurrence, this time slight. Moderate redness and photophobia, pupil smaller, slight pain. V. O. D. = $\frac{20}{200}$.

July 14th. 25*cc* of blood serum were injected and again two days later 25*cc* more administered. Following this, the eye became white, the pupil dilated, the Descemetitis cleared, and the vision had improved to $\frac{20}{50}$ by August 3d.

Steady improvement with no recurrences now took place, and on August 25th, he was discharged. The eye was then white, pupil partially dilated with a band of organized exudate all around its edge. Cornea and vitreous slightly hazy.

Two months later the eye was white. Vision $\frac{20}{30}$, and since then there has been continued slight improvement. During the early part of June he reported with a vision of one letter of the $\frac{20}{20}$ line. The pupil was moderately dilated and apparently bound down with connective tissue along its entire border. He is using his eye and earning a good living. It should be said that the pathological examination of Hurd's eye showed well developed sympathetic uveitis.

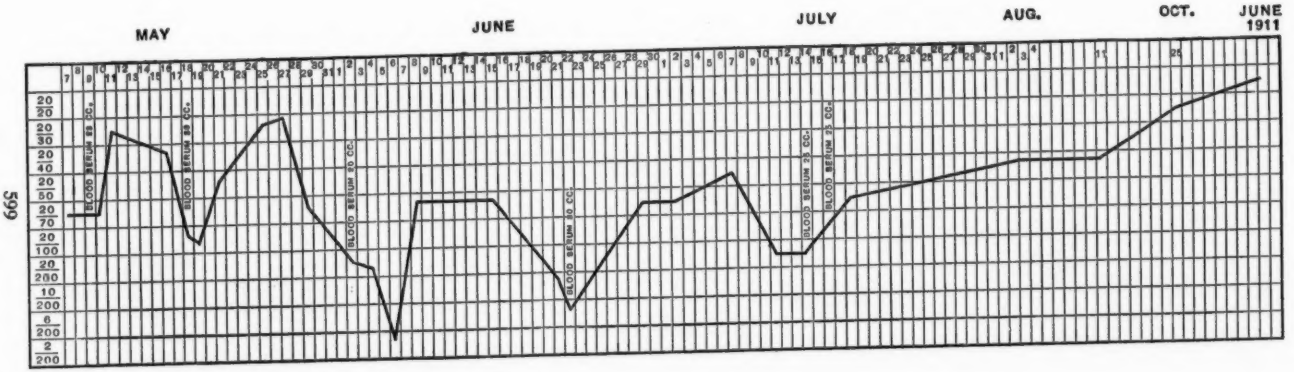
The apparent success of serum injections in this case led to our trying the same treatment on three other well-marked cases of sympathetic uveitis. The first of these received first 20*cc* of serum from Hurd, the first case reported, whose eye then was practically well, and later 25*cc* from the same source, and one injection of 25*cc* from a case who had recovered from sympathetic disease one year previously.

Case 3 received at intervals 35*cc* and two injections of 30*cc*, all from Hurd (Case 1).

Case 4 received one injection of 30*cc* from Hurd.

We are mentioning these cases together and are not going into details about them, because although in certain instances improvement seemed to follow the use of the serum, yet in none was the result sufficiently striking and could not be regarded as sure.

Judging from the action of special sera in other diseases and reasoning by analogy, one would expect that if any good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were to come from the injection of serum in sympathetic inflammation it would come quickly and leave no doubt as to the efficacy of the injection. In other words, it would act like diphtheria antitoxin and anti-meningitis serum. Such was not the case in the two cases reported from the Freiburg Clinic and in three of our cases. In Zur Nedden's case the effect of an injection was striking. Only one injection was given, and the patient recovered.

In our first case it will be noted that improvement following the injection of serum was very rapid, usually taking place within forty-eight hours. In one instance at the worst stage of the disease there was a marked improvement in the appearance of the eye at the end of seventy-two hours. The injection grew less and the pupil began to dilate. During this time, however, the vision continued to diminish owing to the increase in vitreous opacity. Five days after the injection, however, the vision began to improve and rapidly rose from $\frac{2}{200}$ to $\frac{20}{70}$.

It may also be seen from the chart that the improvement in vision which followed the larger doses of serum continued somewhat longer than that observed when smaller doses were given. In this case each of the injections was followed by a very striking improvement. It was the kind of improvement one sees following diphtheria antitoxin. No one could have followed this patient as we did and have doubted that something was producing a remarkable change in a short time. It was the change which Zur Nedden saw in his case and which led him on the basis of this one observation to regard the cure not as an accidental occurrence, but as due directly to the serum.

If the improvement in this case be regarded as no more than a striking coincidence, it certainly must be allowed that it was a coincidence of unusual consistency. The type of the disease was severe, and mercury and the salicylates were pushed to the point of toxicity. They seemingly could not check the disease.

It is apparent that serum will not work in every case, perhaps only in a small minority. We have too little knowledge as yet to give the reasons why. In Case 1 the serum was obtained from a different individual than in Cases 2, 3, and 4.

We may conjecture that there is a great variation in the potency of the serum of different donors and also a great variation in the action of different donees to a given serum.

What the best dose is, we do not know, but, from our observations, probably not less than 30*cc*. And we are also in ignorance of the period in relation to the disease in which it should have its greatest potency. But our first case and that of Zur Nedden lead us to believe that under certain circumstances the blood serum of an individual who has been a victim of sympathetic disease may be of marked curative value when injected into a patient attacked by the same malady.

It is obvious that an opportunity to try out this method of treatment will not often occur, but we believe that further observations along this line are most desirable, for only by a large series of cases can we form a correct judgment as to its value. We hope that the report of this case will stimulate others to add to our very scanty knowledge.

A CASE OF RING SARCOMA OF THE CILIARY BODY.[1]

By Dr. A. N. ALLING and Dr. ARNOLD KNAPP.

(With four illustrations on Text-Plates XVIII. and XIX.)

DIFFUSE or infiltrating sarcoma of the uveal tract, known as flat sarcoma, as distinguished from the circumscribed isolated tumor formation, was first defined by Fuchs in 1882. That form which involves the ciliary body and iris was first described by Ewetsky in 1898 and called by him ring sarcoma. About forty-five of the former variety are on record and about a dozen of the latter. The following is the history of a case of ring sarcoma.

Mary O'Brien, aged 60, consulted me on January 15, 1911, complaining that she had been gradually losing her vision in the left eye during the past two years and that it was now totally blind. About one year after the first blurring appeared, she noticed some dark spots on the sclera. She had had but little pain.

The examination showed no congestion, a clear cornea, a somewhat shallow anterior chamber, and the pupil moderately dilated and immovable. On the iris was some pigmentation, especially at the periphery. The lens was cataractous. Tension was +2, and there was no perception of light. On the sclera, below and to the nasal side, nearly touching the cornea, was a slightly elevated irregularly elliptical tumor about 12*mm* in its longest diameter. Two other tumors of the same sort were seen above the horizontal meridian at varying distances from the limbus. Transillumination gave a deep shadow over the ciliary region and in general as far back as the equator. There was no history of traumatism. She was advised to have the eye removed at once and she entered the hospital on

[1] Read at meeting of American Ophthalmological Society, New London, Conn., July, 1911.

ILLUSTRATING DRS. ALLING'S AND KNAPP'S ARTICLE ON "A CASE OF RING SARCOMA OF THE CILIARY BODY."

FIG I
Episcleral nodules.

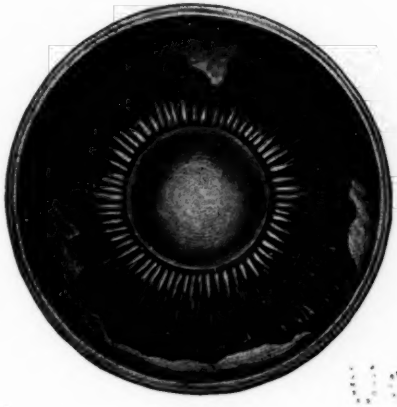

FIG. II
Showing extent of involvement of the ciliary body.

the following day. A physical examination showed the urine to contain a trace of albumin, a few casts, and white blood cells. There was a systolic murmur and the heart was enlarged to the left. The liver did not extend below the costal border, and its lower edge was smooth. The arterial blood pressure was 160*mm*. There were no glandular enlargements.

The eye was enucleated with a portion of the optic nerve, but no masses were felt in the orbital cavity. Four months after the operation no recurrence or metastases were apparent.

Pathological Report (Dr. Arnold Knapp)

On the anterior scleral surface of the eyeball there are three black irregular flat elevations (Fig. 1). Two of these are next to the cornea; the third is some distance posterior.

After dividing the eyeball in the equator and looking at the reverse side of the anterior half (Fig. 2), the whole region of the ciliary body is seen occupied by a flat black mass which ceases irregularly between the equator and the ora serrata, except at one point where the mass extends back near to the optic nerve.

The eyeball was fixed in formol, hardened in alcohol, and cut for microscopic examination after imbedding in celloidin. A cross-section through the thickened part of the ciliary tumor reveals the following macroscopic changes. From the equator anteriorly within the sclera is a black tissue which involves the choroid and gradually increases in size to attain a thickness of 1*mm* in the ciliary body. At a point posterior to the ciliary body this has invaded the sclera and is indirectly continuous with a small black extraocular mass, superficial to the sclera. On the opposite side of the section, the black mass in the choroid rapidly increases in size and forms a tumor, 5*mm* antero-posteriorly and 1½*mm* thick at the junction of ciliary body and iris. On the sclera over this part of the ciliary body is a rounded flat black mass, an episcleral tumor.

Microscopically the mass is a pigmented structure which only occasionally permits the recognition of anatomic detail. It is made up of spindle cells in characteristically interlacing bands and invades principally the uvea. In the region of the greatest infiltration, at the base of the ciliary body on one

side, the cells are fusiform and pigmented. Among them and in other parts of the tumor deep black pigment is present in round ball-like masses. These round pigment deposits are crowded together in some places making a pitch-black mass, in other places they are arranged in irregular groups or in strings. The epibulbar nodes are moderately pigmented. In depigmented sections (Alfieri's method: permanganate of potash and oxalic acid) a much better idea of the nature of the cells is possible, and the exact infiltration of the tumor determined.

The tumor reaches its greatest development at a place where the ciliary body and iris are both involved, so that nothing of their original structure is visible. The adjoining angle of the anterior chamber is filled with the tumor. The tumor infiltration has everywhere invaded the pectinate ligament and is prolonged along Descemet's membrane and has extended into the ciliary processes, which are crowded together. Occasionally the tumor appears less dense and these spaces are occupied by peculiar cells with large round protoplasmic bodies and a small round nucleus (Fig. 4). They are the carriers of the deepest pigment and resemble the free pigment cells of Fuchs.

"Free pigment cells" is a term which Fuchs introduces in his recent article on "Sarcoma of the Choroid" (*Graefe's Arch.*, vol. lxxvii., No 2, 1910). These cells are round large cells with coarsely granular pigment, which occupy no particular relation to the other pigment cells. Their nuclei are much too large for endothelia, nor are they ever found in the latter's characteristic alveolar grouping. In this specimen they seem to be derived from the spindle cells, though no direct transition was found. They practically develop where the looseness of the tissue permits them to assume their enlarged round contour. With this growth the increased pigmentation occurs and then, their life cycle being short, they are prone to undergo necrosis. These cells lie mostly in the infiltrated iris, and in that part of the ciliary body between the muscle and the processes. In two other regions just posterior to the ciliary body and at another farther back, the tumor is composed entirely of these cells and has undergone necrosis. The cell contours are lost, the nuclei are degenerated and smaller,

ILLUSTRATING DRS. ALLING'S AND KNAPP'S ARTICLE ON "A CASE OF RING SARCOMA OF THE CILIARY BODY."

FIG III
Showing the general "topography of the tumor invasion

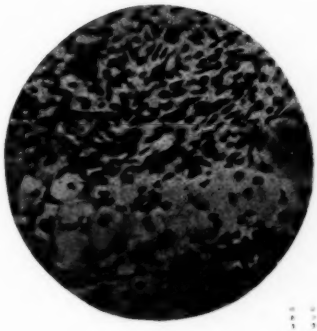

FIG. IV.
Showing free pigment cells in among spindle cells.

often lying free in a mass of homogeneous detritus. In the periphery and scattered throughout this area there are well preserved examples of these free pigment cells. In one of these regions the tumor has diffusely infiltrated the sclera and formed an episcleral nodule. The necrosis has attacked some of the intervening scleral tissue. The retina in these regions shows inflammatory and degenerative changes.

The areas of necrosis in this tumor are characterized by diffuse and deep pigment. In the depigmented sections these areas are entirely made up of these peculiar cells and their degenerate and regressive forms. The necrosis is readily explained by the lack of blood supply; the tumor itself being unusually free from blood-vessels, wherein it, of course, differs from the usual choroidal sarcomata. The inflammatory changes (irido-cyclitis) which are so frequently associated with necrosis are lacking, except for a few discrete episcleral collections of leucocytes and the optic neuritis, the external surface of the sclera showing several inflammatory foci and the optic nerve being cupped and inflamed. In the anterior half of the eye there are no inflammatory signs.

This flat and ring-like extension of a tumor distinct from the circumscribed variety has several now well recognized characteristics. It is a striking example of a tumor growing within the boundaries of its original host—the uveal tract in this instance. In its invasion the suprachoroidal space is obliterated. The tendency to form episcleral nodules at either the site of the perforating vessels or where the sclera is eroded is pronounced, while Bruch's membrane forms a barrier to inward growth. Parsons explains this extension by the growth invading principally the outer layers of the uvea and so gaining access early to the suprachoroidal space. In the above ring sarcoma the endothelial character of the cells is lacking, a feature which Parsons also speaks of.

REMARKS: The question as to whether the ring is entire or whether the tumor affects only the iris may be of little importance pathologically, for we know that the tendency of these growths, wherever their origin, is to invade the whole uveal tract sooner or later. It may be useful, however, to divide the cases topographically into those in which there

is a complete, and those in which there is an incomplete, ring sarcoma, and to designate whether it includes the ciliary body, the iris, or both.

If we confine ourselves to the reported cases in which a diffuse growth was present in the form of a complete ring, involving the ciliary body, apparently originating therein, with or without extension to the adjacent portions of the uveal tract, I have been unable to find but eight examples of this sort. A few cases are on record in which the ciliary body was affected only in part, as, for example, some of the cases described by Ewetsky and Meyerhof, others where the iris was principally involved, as those of Nettleship, Hanke, and recently A. Alt.

A brief description of the cases of complete ring or annular sarcoma of the ciliary body is here given.

Ewetsky's (1) is the first on record, and was in a woman of 39, from whose iris a melanosarcoma had been removed eleven years before. There were three pigmented spots under the bulbar conjunctiva and areas of pigment on the iris. A circumscribed tumor was found behind the lens, springing from the ciliary body. The ciliary body and also parts of the iris were infiltrated with sarcoma cells in a complete ring. It was a round- and spindle-celled myxosarcoma.

Von Rechtperg (2) describes a case of a male of 20. There were brown spots on the iris and ectropion of the pigment layer at the pupillary edge. Nine years later the eye was hard, blind, and painful. The iris and ciliary body were found infiltrated with a deeply pigmented sarcoma.

Meyerhof (3) saw the case of a woman, 60, in which the ciliary body and iris, as well as the angle of the anterior chamber, were involved in the whole circle. It was a spindle-celled melanosarcoma.

Meyerhof also relates another case, giving neither sex nor age, in which a primary tumor of the iris extended to include the whole ciliary body in a ring. It was composed of pigmented polygonal and spindle cells.

Parsons's (4) case, a boy, 14, was injured seven years before. There was ciliary staphyloma, and a growth *2mm* thick infiltrating the whole circle of the ciliary body and the iris. There was also involvement of the cornea and sclera. It was a spindle-celled leucosarcoma.

Werner (5) reports the case of a male, 18, with a tumor af-

fecting the whole ciliary region, having abnormal pigmentation of the iris. The ligamentum pectinatum and Schlemm's canal were full of pigmented cells.

Wintersteiner (6) saw an eye from an old woman showing episcleral growths overlapping the cornea. The ciliary body was entirely invaded, but there was no thickening of the iris.

Bergmeister's (7) case was a man, 61. The entire ciliary ring with the iris was affected. There was pigmentation of the iris and cataract. The growth had in one place broken through the epithelium and was pressing against the equator of the lens.

If we further examine the histories of the cases of ring sarcoma, we find that *glaucoma* was present in every one except that of Bergmeister. The high tension, usually having an early onset, has been generally attributed to the involvement of the iris angle and closure of Fontana's spaces. In the present instance this might suffice for explanation, since the ligamentum pectinatum was everywhere infiltrated. It seems probable that many of these tumors are overlooked, for the eyes are likely to pass into the condition of absolute glaucoma, and the macroscopic findings are not striking on account of the diffuse character of the lesion.

In only three cases is an *external growth* mentioned, the proportion of episcleral extension being somewhat greater in flat sarcoma of the choroid. The perforation appears to take place by means of the scleral vessels, but may also, as partly in this case, be through erosion of the sclera.

In about half of the cases there was associated with the diffuse growth a definite circumscribed *intraocular tumor*, either presenting into the vitreous or into the anterior chamber at the iris angle, and in all of them this was probably the site of the original growth. In the present case, although there was one area of greater thickening, there was no such well-marked tumor.

Practically all showed spindle cells, and in some cases endothelioid cells are mentioned. This has led some authors to classify the flat sarcoma as an endothelioma, as does Parsons. Most of the cases were pigmented.

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PHANTOM INTRAOCULAR TUMOR.[1]

By Dr. ARNOLD KNAPP.

IN describing the conditions which may simulate a choroidal sarcoma, Haab in his book on *Ophthalmoscopy*, third edition, page 82, speaks of the so-called phantom tumors which, arising probably from the retina in the anterior part of the eyeball, produce one or more rounded prominences. They are presumably cysts resulting from senile degeneration of the retina, and may disappear without a trace.

Through the courtesy of Dr. A. N. Alling of New Haven, I had the opportunity of seeing a case where clinically the diagnosis of sarcoma of the ciliary body was made; after enucleation no tumor was found, but cysts of the pars ciliaris retinæ were present.

Mrs. C. N. I., aged 73, was seen on November 1, 1910. She stated that the left eye became red in May and for the last six weeks had protruded. The eye is pushed straight forward; some of the conjunctival vessels are unusually congested. Palpation of the margin of the orbit is negative; except at the upper and inner angle there is a nodular mass to be felt which pulsated. V = $\frac{20}{70}$. The optic nerve was normal. The fundus revealed distinct arterio-sclerotic changes in the retinal vessels, a few small hemorrhages, and below in the periphery a shallow detachment. After dilating the pupil, a round brownish swelling was easily seen by oblique illumination back of the iris on the temporal side. Tension normal. The diagnosis of intraocular tumor with an orbital extension seemed clear. Dr. Alling enucleated the eyeball; there was no tumor in the orbit, but an aneurism of the ophthalmic artery. The eyeball was opened and again no tumor was found; the interior seemed normal

[1] Read at meeting of American Ophthalmological Society, New London, Conn., July, 1911.

to the naked eye. The eyeball was placed in formol and sent to me for examination. After hardening in alcohol and celloidin-imbedding, antero-posterior sections were cut and stained in hematoxylin-eosin. Microscopic examination showed typical senile changes in the retina, choroid, and ciliary processes. In addition to pronounced cystic degeneration of the retina (so-called Iwanoff's œdema), there are distinct changes in the epithelium in the pars ciliaris retinæ. The inner or non-pigmented epithelium shows degenerative and proliferating changes. The cells are distended, some with vacuoles; some contain a bluish homogeneous mass. Large cysts are formed, which are lined with cells and contain a substance stained faintly blue with many fine interlacing lines (mucin). In other sections, the entire non-pigmented layer is separated from the underlying pigment epithelium by a collection of mucin. The tumor recognized clinically was presumably a large cyst or detachment just described, which ruptured on opening the eye immediately after removal.

Pagenstecher, in an article on "Multiple Cysts on the Posterior surface of Iris and on the Ciliary Body" (*Graefe's Archiv*, vol. lxxiv.), describes a case where a cyst of the posterior surface of the iris pushed the iris forward. A diagnosis of malignant tumor was made. After enucleation a separation of the two pigment layers at the posterior surface of the iris was found corresponding to the site of the tumor. Other smaller cysts were present. No glaucoma was present, though in Wintersteiner's case, quoted in the preceding article, symptoms of increased tension were present.

A CASE OF SARCOMA OF THE CHOROID IN A TUBERCULOUS SUBJECT.

By DAVID WEBSTER, M.D., New York.

(With two illustrations on Text-Plate XX.)

Miss K., a school-teacher aged 28, first consulted me February 12, 1910. She said that three weeks previously, while rubbing her right eye, she noticed the printed words she looked directly at seemed too small, while the print on the rest of the page appeared to be of the natural size. Ever since she has observed that distant objects looked smaller with the left eye than with the right. She sees three small black spots with the right eye, one above the other two. She has recently had several attacks of headache. R. V. = $\frac{20}{20}$, L. = $\frac{20}{30}$. The left pupil is slightly larger than the right. Both pupils react normally to light and to accommodative effort. R. V. = $\frac{20}{15}$ with +0.25 D. L. V. = $\frac{20}{15}$ with +0.50 = +0.25 D., cyl. axis 90°. Tension normal and both visual fields of normal size.

Examination of the interior of the eye revealed a large pigmented area situated in the infero-temporal quadrant of the fundus. This slate-colored patch was nearly circular, slightly oval perhaps, and approached to within about a disk's diameter of the papilla. The area of the patch was about three times that of the disk. Sparsely scattered over it were very faint whitish spots, visible only on close inspection. There were also two or three whitish, or very pale pink streaks running through it. This pigmented patch was sharply defined, and there was no other fundus lesion. Some small retinal vessels ran over this patch, and were nowhere obscured by pigment or by exudation.

I thought this lesion to be a rare form of choroido-retinitis, and referred the patient to Drs. VanValzah, Nisbet, and Hayes for a general overhauling to ascertain, if possible, the cause and any indications for treatment. Dr. Nisbet found her physically normal, except that there was an area

of dulness over the apex of the right lung. He applied Von Pirquet's test, which gave a positive reaction. He thought the eye lesion was probably tubercular, as he could find no other cause, and advised rest and outdoor life. After spending three weeks at Atlantic City, she came to see me again, on March 9th, and I found no change except that the pigmented area was somewhat larger and the vision was $\frac{20}{30}$ with + 0.50 D., c. axis 90°. Dr. Edgar S. Thomson kindly made an ophthalmoscopic examination and confirmed my opinion that the lesion was a tubercular affection of the choroid. On April 2d I found the vision and the condition of the fundus much the same.

On April 10th, Dr. Nisbet examined her and reported that the dulness of the right apex had disappeared and that Von Pirquet's test was negative. She said that she felt perfectly well but thought that her sight had deteriorated. Though her vision was $\frac{20}{40}$ with +1 D., c. ax. 90°, she was conscious of a scotoma in the upper part of her field. I sent her to Dr. Alfred Braun, of this city, who made a very good picture of her fundus. I put her upon the iodide of potassium in moderate doses. After taking this for a time she became convinced that it caused pain in the eye. While taking the medicine, the eye would be painful; on stopping it, the pain would cease. So she stopped it altogether.

In the latter part of June, Miss K. married, and I did not see her again until September 30th. The vision was still $\frac{20}{20}$ with correction, but the pigmented area had increased in size, though I was still unable to detect any thickening of the tissues involved. I urged her to go into the Manhattan Eye, Ear, and Throat Hospital, where everything possible would be done to throw light upon the origin and nature of this rare disease. But she said it would be impossible for her to do so at that time.

The next time I saw her was on January 24, 1911. The vision had fallen to $\frac{20}{400}$ with +1 D. ⊃ 1 D., cyl. ax. 90°. The pigmented area had very nearly reached the disk and could be distinctly seen through a +4 D. The lower part of the retina was detached and could be seen through + 8 D. I now began to suspect a neoplasm, and so informed the patient. After consulting several distinguished ophthalmologists in this and other cities, the patient finally consented to come into the Hospital.

She was admitted to a private room on January 28, 1911. Pulse 80, respiration 20, temperature 98$\frac{2}{5}$°. On January 30th, she was given, by hypodermic injection, one milligram of tuberculin, at 5:30 P.M. The next morning at 2:30, she complained of nausea and vomited twice a dark fluid. At 6:30, she had pain in her joints. At 8:00 A.M., pulse 102,

ILLUSTRATING DR. WEBSTER'S ARTICLE ON "A CASE OF SARCOMA OF THE CHOROID IN A TUBERCULOUS SUBJECT."

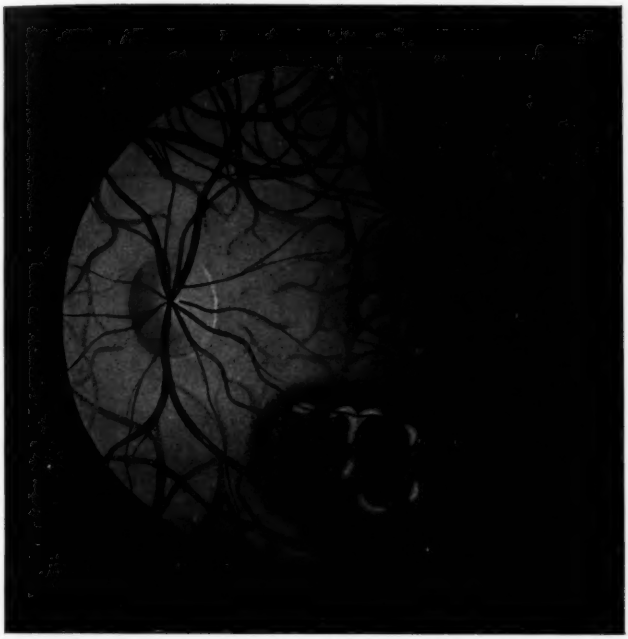

FIG. 1.

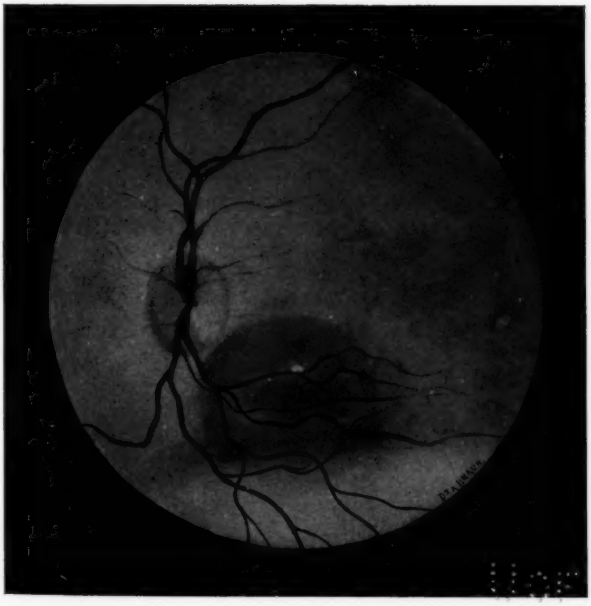

FIG. 2.

respiration 24, temperature 101°. She complained of headache and abdominal cramps. At 12:00 noon, pulse 104, respiration 24, temperature 100⅘°. At 8:00 P.M. pulse 80, respiration 20, temperature 101 $\frac{8}{10}$°.

February 1st.—Slept well. 8:00 A.M. pulse 80, respiration 20, temperature 98⅘°. Feels comfortable. Slight nose-bleed. At 8:00 P.M. temperature 99°.

February 2d.—8:00 A.M. pulse 92, respiration 20, temperature 98⅗°. The general reaction to the tuberculin lasted therefore about two days. There was very little local reaction, only a brief conjunctival redness, and a small cluster of minute hemorrhages at the outer edge of the growth, which, however, one of the surgeons had observed before the tuberculin was administered. At 2:30 she was taken to the clinic where several doctors examined the eye with the ophthalmoscope, and on returning to her room she fainted. A couple of hours later she went down to the ophthalmoscope room to be examined with the ophthalmodiaphanoscope, which Dr. E. S. Thomson had kindly procured for the occasion. With this instrument, with its 500-candle power, placed in the back part of the mouth, one could see the fundus perfectly, easily distinguishing the dark opaque growth, from the rest of the fundus. The closer the observer placed his eye to the patient's, the more clearly he could see the fundus, the whole of it being illuminated at once, instead of a small part as with the ophthalmoscope. Dr. Alfred Braun made another picture of her fundus during her stay in the Hospital.

On February 4th, in the afternoon, the eye was enucleated, nearly a year after I first saw the patient.

The following is Dr. E. S. Thomson's report of the macroscopical and microscopical examination of the tumor:

"March 3, 1911.—The examination of Mrs. J's eye shows a small discoid tumor of the choroid, 8*mm* in diameter and 2*mm* thick, lying to the temporal side of the optic nerve. This tumor is a spindle-celled sarcoma, apparently pigmented for the most part and extending in the direction of the optic nerve, which, however, is not involved. The retina below is detached and somewhat thickened, and a collection of serum has gravitated to the lower part of the globe. The overlying retina is thickened somewhat. No traces of extension are apparent in the sections examined and the growth is sharply limited. I should not expect local recurrence."

AN OPERATION FOR IMPROVING THE POSITION AND ACTION OF THE EYELIDS IN CONGENITAL AND PARALYTIC PTOSIS

By Dr. GEORGE T. STEVENS, New York.

(With two photographs on Text-Plate XXI.)

A CONSIDERABLE number of operations have been suggested for the improvement of the position of the eyelids in paralytic ptosis, some of which relieve in a measure the drooping of the lids, but most, if not all, of which leave an added deformity to the unfortunate subject of the defect.

All operations in which a section of skin is removed necessarily result in a flattening of the parts, abolishing the natural folds and rounded projections which are essential to an agreeable appearance of the eyelids.

It must, of course, be conceded at the outset that no operation which will permit of a natural closure of the lids will, in bad cases, relieve the face of the subject of ptosis of the expression of effort about the eyes, yet, while aiding in the function of the elevation of the lid in the interest of vision, we may not only avoid introducing a new deformity, but we may render less conspicuous the defect with which we have to deal.

The operation which I am briefly to describe and which I have practised during the past twelve years, consists, like that proposed by Everbusch, Hugo Wolf, and some others, of an advancement of the elevator muscle of the upper lid, but it differs from them in the technique and appears to me, after practising several methods, to promise better results than any with which I am familiar.

Of course the operation assumes not only the existence of the levator palpebræ muscle but a certain muscular elasticity.

ILLUSTRATING DR STEVENS'S ARTICLE ON "AN OPERATION FOR IMPROVING THE POSITION AND ACTION OF THE EYELIDS IN CONGENITAL AND PARALYTIC PTOSIS.

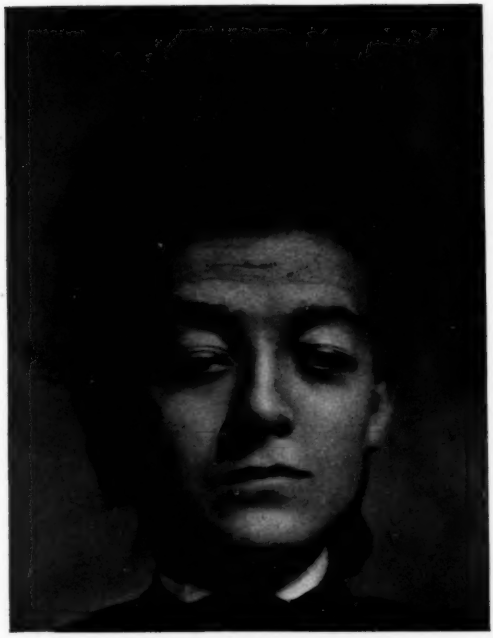

FIG. 1.

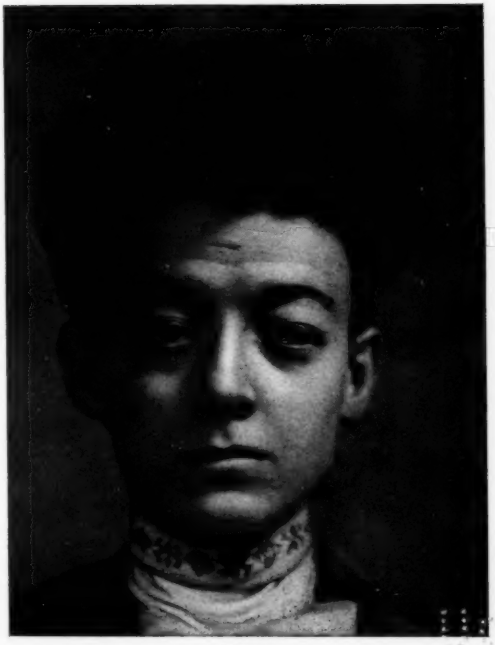

FIG. 2.

I shall describe the process in connection with a case, and the copies of photographs here shown suggest the improvement which may be expected from the method of operating in a bad case. In lighter cases even much more agreeable results may be looked for.

The operations in the case represented were done, in 1896, for Miss E. G., the condition of whose eyelids is shown in Fig. 1, and the description of the procedure in that case will serve as a general description of the method.

A solution of cocaine having been injected under the skin of the upper lid, an incision extending along the whole length of the border was made as nearly as possible to the row of the cilia, but so directed as to avoid injury to the roots of the lashes. The skin of the lid was then dissected so as to uncover the whole extent of the cartilage. The attenuated fibres of the elevator muscle of the lid were then separately and very carefully dissected from their attachment to the cartilage, after which half a dozen very fine sutures drew the free extremity down and attached it to the tissues just above the original line of incision. One end of each suture was cut close to the knot; the other end was uncut. When the whole extent of the free extremity of the muscle was thus made fast, the skin was brought back to its former position and by several very fine sutures secured in place. The free ends of the sutures attaching the muscle were folded back and secured by a strip of court-plaster.

No further treatment was required until it was necessary to remove the sutures. Those securing the muscle were removed by a slight traction on each, and a day or two later those in the skin were cut and removed.

When healing had followed, which was in a few days, no cicatrix was visible and the lid was in a materially improved position. After an interval of a few days a similar advancement of the levator palpebræ of the other eye was done.

The result is shown by the photographs. The patient closed the eyes naturally in sleep and found marked relief in waking hours from her ability to raise the lids. As the photograph No. 2 shows, none of the natural folds of the skin were obliterated or reduced. On the contrary, they were somewhat accentuated, to the advantage of the appearance

of the patient. Naturally the tensions about the brows continued, but the pulling at the eyebrows was less noticeable than before.

I have done this operation a number of times, always with satisfactory result.

RESEARCHES ON THE INFLUENCE, WHICH THE SIZE OF THE PUPIL, THE ACCOMMODATION, AND THE CONVERGENCE HAVE UPON THE TENSION OF GLAUCOMATOUS AND NORMAL EYES.

By Dr. V. GRÖNHOLM, Helsingfors, Finland.

Abridged Translation from *Archiv f. Augenheilk.*, the German Edition of these Archives, Vols. LXVI. and LXVII., 1910, by Dr. M. I. Schoenberg, New York.

I.—INTRODUCTION.

OBSERVATIONS on attacks of acute glaucoma and aggravation of the glaucomatous condition in the other eye following a glaucoma operation on the first eye.

Clinical experience has shown us that, after an iridectomy for acute glaucoma, the other eye may also develop an attack of glaucoma, and this occurs mostly when the operation is made during the acute stage of the disease. Von Graefe (1) reports that this curious succession appeared in about ten per cent. of his operated patients who had no symptoms of glaucoma at all in the other eye; while about twenty-five per cent. of his operated patients who had some prodromata of glaucoma in the better eye showed an aggravation of symptoms in that eye after an operation on the one with marked glaucoma.

The attack of glaucoma usually appears between the second and fourth day and only very rarely as late as the second week after the operation. According to the observations of Schmidt-Rimpler (2), we find that in patients where the trouble in the better eye does not show the intensity of an acute attack, the subacute symptoms, which had existed previous to the operation, are somewhat intensified and appear more frequent

for a few days. When the second eye has also an acute glaucoma or has just passed through an attack of glaucoma, an aggravation of the symptoms may appear in this eye, after an operation on the first one.

This succession happens mostly in cases of the primary inflammatory type and only exceptionally in other types of glaucoma. Mooren (2) relates two cases in which, after an iridectomy in one eye, an attack of acute glaucoma appeared in the other eye previously blinded by glaucoma simplex. The causal connection between the iridectomy on the first eye and the outbreak of an acute glaucoma in the second one, which happens so frequently, led many surgeons to use miotics in the non-operated eye for some time before the operation. The real cause of this pathological succession has not yet been explained; only suppositions have been advanced. Schmidt-Rimpler (2) believes that it is due to the operative trauma, and, above all, he attributes it to the psychical trauma of the operation. The excitement through which the patient passes the days before the operation could be a sufficient reason for the outbreak of the attack when we remember that great excitement may be one of the causes of an acute attack of glaucoma.

In the *Encyclopédie française d'ophtalmologie*, da Gama Pinto (3) says: "It is therefore probable that the other eye, although of healthy appearance, has a predisposition for glaucoma, and that the emotion before and during the operation suffices to transform this predisposition in an actual condition of glaucoma. This interpretation is the more plausible as we can actually prevent this danger by instillations of miotics in the non-operated eye, and by quieting our patients, by keeping them in a light room and bandaging only the operated eye."

On the other hand, if intense emotion would be the cause of the outbreak of the glaucomatous attack, why should this attack not come on before the operation, when the uncertainty about the outcome, etc., is more exciting than after the operation? But the reverse happens: in fact the attack occurs always after the iridectomy, while the patient is lying in bed with both eyes bandaged.

Other authors, as Arlt, Bowman, Laqueur (2), have looked

upon this succession as a mere coincidence, occurring mostly in those patients who have had before the operation some prodromal symptoms in the other eye; but since Von Graefe has shown that the attack of glaucoma in the second eye occurs more rarely in the non-operated than in the operated ones, we must admit that there is a provocative element in the operation.

I will relate about a case in which the cause of an attack of glaucoma in the second eye after an iridectomy in the first one is very plainly made out. This case shows that the attack is sometimes caused by the prolonged dilatation of the pupils and the relaxation of the accommodation under the influence of a binocular bandage. The size of the pupils and the amount of accommodation can have a dominant influence on the intraocular tension. The observation of the above mentioned fact has induced me to study the relation between the size of the pupils and the accommodation and the intraocular tension in all the patients which I have lately seen, and also in normal eyes. I also studied the influence of the convergence upon the ocular tension. My material consists as follows: A case with prodromal symptoms of glaucoma; one with beginning glaucoma; one with an acute inflammatory glaucoma (in which the eye was examined before, during, and after the attack, with the pupils reacting and non-reacting to light after eserine); 5 cases with glaucoma simplex and good pupillary reaction; 2 cases with glaucoma simplex and diminished reaction of the pupils; and finally 35 normal eyes, one of which had diminished reaction of the pupils. Seven normal eyes were examined with the tonometer before and after atropine drops. We instilled atropine in order to eliminate the accommodation and the change in the size of the pupils and also to control the exactness of our method in taking the tension.

II.—METHOD OF EXAMINATION.

We produced the changes in the diameter of the pupils by keeping the patients first in a completely dark room from ½ to 2½ hours and sometimes a whole night, and sitting them afterwards at a window to look at the sky; or, at first they were looking for a certain length of time at the sky and then

were seated in a dark room. The hyperopes wore strong convex glasses to obviate any effort of accommodation; the emmetropes and myopes had no glasses on. The examinations were made during the last summer, mostly on sunny days. For the accommodation tests we took the ocular tension with the tonometer before and after the subjects had read for about an hour, keeping the book quite near to the eyes. The reading was done near the window and also in a place with the smallest possible illumination. The tests were made as is shown in table on p. 621.

We did not make all these tests on each subject. The most important ones are the dark and light tests (when the width of the pupils is not interfered with by the accommodation) and the reading tests with the pupils contracted (when the effect of reading alone can best be observed).

We measured the intraocular tension with the Schiötz tonometer, after having instilled a few drops of a two per cent. (2%) solution of holocain. The correct technique of using the instrument is of great importance. Reliable data are obtained only if the plate of the instrument is applied just on the centre of the cornea, while the eyes look straight upwards and the instrument is perfectly perpendicular and on the plane of the cornea. Restless patients who close their lids or who do not fix well, or persons with irregular curvature of the cornea, etc., are improper subjects for examination. The tension should be taken three times during each examination, which does not last more than about half a minute. The reading is done on the table of Schiötz, which shows the tension calculated in *mm* of Hg.

We have also measured the depth of the anterior chamber with the aid of our hydrodiaskope, as this depth may occasionally have some relation with the intraocular tension. We will relate first our findings on patients with glaucoma; then our studies on the variation of tension in normal eyes, and lastly our observations on the influence of convergence upon the ocular tension.

III.—OBSERVATIONS ON THE TENSION IN GLAUCOMATOUS EYES.

CASE 1.—Eye 1. Glaucoma prodromale O.D. Colo-

1.	Light (patient sitting at the window)	Tension taken.	Dark (patient sitting in the dark)	Tension taken	= Dark Test.
2.	Dark	Tension taken.	Light	Tension taken	= Light Test.
3.	Reading in the light (at the window)	Tension taken.	Reading in the dark.	Tension taken	= Dark Test by reading.
4	Reading in the dark	Tension taken.	Reading in the light.	Tension taken	= Light Test by reading.
5	Light	Tension taken.	Reading in the light.	Tension taken	= Reading Test with contracted pupils.
6.	Reading in the light	Tension taken.	Sitting in the light	Tension taken	= Reading Test with contracted pupils.
7.	Dark (sitting in the)	Tension taken.	Reading in the dark.	Tension taken	= Reading Test with dilated pupils.
8.	Reading in the dark	Tension taken.	Sitting in the dark	Tension taken	= Reading Test with dilated pupils.
9.	Reading in the light	Tension taken.	Dark (sitting in the)	Tension taken	= Rest and dark Test
10.	Dark (sitting in)	Tension taken.	Reading in the light.	Tension taken	= Reading and dark Test
11.	Light (sitting in)	Tension taken.	Reading in the dark	Tension taken	= Reading and dark Test
12.	Reading in dark	Tension taken.	Light (sitting in the)	Tension taken	= Rest and light Test.

boma artefactum O. S. Woman, 39 years of age, was first seen by us on May 20, 1902, and says that during her labor pains (patient has had twelve children) she felt pain in the eyes, and dimness of vision, characteristic of attacks of glaucoma, which disappeared after she had slept for some time after the confinement. The last attack returned four months ago, while the patient was convalescent after grippe. At present the patient complains of headaches and pain in the eyes. V.O.D. = 1 with −0.50 sph. −1.50 cyl. 50° nas. V.O.S. = 0.5 with −0.75 sph. −1.50 cyl. 25° nas. Field of vision and fundus normal. Tension normal (palpation with fingers).

Patient calls again six years later complaining that during the spring of 1908, she had seen colored rings while looking to artificial light, had often dimness of sight and also burning and pains in both eyes. Most of the attacks occurred after some sort of excitement or strain. V.O.D. = 0.5 with −1.25 sph. −1.50 axis 50° nas. Tension (tonom.) 28*mm* Hg. Field of vision and fundus-normal. V.O.S. = 0.5 with −1.75 sph. −1.50 axis 25° nas. Tens. 43*mm* Hg. Field of vision = nasal 30°, Temporal 60°, above 40°, below 50°.

Papilla shows some excavation; anterior chamber shallow. We prescribed pilocarpine. A few days later iridectomy O.S.; bandage over both eyes.

The next day after the operation, when we took off the bandage, we found the non-operated eye congested; the cornea was somewhat opaque, pupil dilated; T. +1. Patient sees colored rings around the flame of the candle; the symptoms disappear after daily use of eserine, and reappear as soon as eserine is stopped. Three weeks later, during one of these attacks of prodromal glaucoma, the tension was 75*mm* Hg; the use of pilocarpine reduced the tension to 21*mm* Hg, and the other symptoms, as the perception of colored rings, the haziness of the cornea, etc., disappeared with the exception of the shallowness of the ant. chamber, which remained the same as during the attack. T. = 50*mm* Hg; after pilocarpine the same day = 21*mm* Hg. Patient calls again in May, 1909, and says that the attacks were less frequent during the spring than during the winter. We took the ocular tension of the right eye and made the following tests.

May 24, 1909: at 5:45 P.M., pupil 3*mm* wide; T. 37*mm*. We instilled pilocarpine twice.

At 6:5 P.M. pupil 1*mm* wide; T. 28*mm*.

At 6:30 P.M. pupil 1*mm* wide; T. 22*mm*.

May 25, 1909: 11:30 A.M. pupil 3*mm* wide; T. 28*mm*.

8:00 P.M. pupil 5.5*mm* wide; T. 40*mm*.

May 26, 1909: 11:00 A.M. pupil 4.5*mm* wide; T. 37*mm*. Patient reads with face towards the window. Pupil 2*mm*. After 45 minutes' reading, T. 28*mm*.

Patient sits in the dark 45 minutes. Pupil 5.5*mm*. T. 65*mm*. Slight pericorneal congestion; cornea hazy; patient sees with right eye rainbow-colored rings around the light.

Patient looks to the bright sky for 10 minutes. Pupils contract 2–3*mm*. T. 55*mm*. The haziness of the cornea and the congestion are diminished; the colored rings are still perceived.

Next day 8 P.M., patient did no reading; she took a long walk in clear weather and had just arrived. Pupils 5*mm*. T. 37*mm*. Patient reads for about 20 minutes in a dark room. Pupil 5*mm*. T. 37*mm*.

Patient had always slept in a light room without shades and near the window. I put her to sleep in a perfectly dark room. Next morning when I called, she had been awake for an hour in the dark room. She sees rainbow rings around my candle with the non-operated eye only; cornea is hazy; pericorneal injection; pupil 5*mm*; no change in the depth of the ant. chamber.

May 27, 1909. 8:30 A.M., T. 77*mm*. Shades opened and patient looks to the cloudless sky. Pupils: 2*mm* after 5 minutes, T. 72*mm*; after 15 minutes, T. 63*mm*; after 35 minutes, T. 63*mm*. Patient dresses, at 9:30 A.M., T. 70*mm*; 10:30 A.M., T. 52*mm*. Patient reads in good light for one hour. Pupil 1.5–2*mm*, T. 32*mm*.

She says that during the reading the vision becomes clearer and the feeling of pressure in the eye disappeared.

Patient sits in the dark for twenty minutes, T. 52*mm*. She says that she has a feeling of tension in the right eye and the vision becomes indistinct. As the patient had to go away, I advised her to read much, to avoid darkness, to sleep as until now, in a light room, and use pilocarpine when necessary. She wrote me that she had had only one slight attack during the summer and did not use pilocarpine at all.

This case of prodromal glaucoma is of interest because it showed great and rapid variations in the ocular tension (28–77*mm*) and also the constant relation between the diameter of the pupils and the ocular tension. The tension decreased 10*mm* during 10 minutes; then other 18*mm* during 6 hours, then other 25*mm* during 2 hours, while the pupil was contracted by light and the accommodation was the same. (Light Test.)

The tension increased when the pupil became dilated in the dark. (Dark Test.) Tension became 77*mm* after

one night's sleep and after being awake one hour in the dark room.

A great decrease of tension occurred by reading, but only when pupils were contracted.

The rapid change (from reading in the light) to complete rest (sitting in the dark) was followed by a quick rise of the ocular tension; also the sudden change from complete rest to a strain of accommodation (reading in the light) showed a decrease of tension.

Patient feels comfortable with a tension below 60*mm* Hg. Above this limit she complains of pressure and tension around the eye; she sees colored rings about the flame; has pericorneal injection; the media become cloudy, pulsation of veins on the disk is perceived; vision and field of vision remain normal. It would be interesting to study the degree of tension at which these various symptoms appear and disappear; but we had no opportunity to make that out. It is probable that the degree of tension is not the only determinant factor in the appearance of the various symptoms of glaucoma. The duration of this high tension must have a greater bearing on this condition. The depth of the ant. chamber remained the same during all these variations of the ocular tension.

The fact, that our patient related, that she had slight attacks of glaucoma some twenty years ago during three deliveries and after an attack of grippe, could be explained when we think that during this time she had to stay home in a semi-dark room, with her pupils constantly dilated for several days. She did not read and her vitality was lowered. All these are sufficient to produce a mydriasis and consequently an attack of glaucoma. The circumstance that she felt better in the morning is easily understood because the pupils contract during sleep.

Patient says that she was compelled to use pilocarpine almost daily during the winter months, but felt well in the spring and summer. This could also be explained when we consider that the pupils are more dilated in the dark winter days than during the bright summer days. Excitement usually calls forth the trouble in her eye because psychical irritations are generally accompanied by a dilatation of the pupils.

CASE 2.—Eye 2. Glaucoma incipiens simplex O.S.

Clerk, 48 years of age, suffers since 13 years from a mild diabetes. Vision in both eyes is normal. Field of vision normal, also by Bjerrum test. Ant. chamber quite shallow, *2.2mm*. No ciliary injection; pupils react well.

V. O. D. and V. O. S. = 1 with +0.75 D. Reads Jaeger No. 1 with +2 D.

We took the tension in both eyes while the patient was in the dark, in the light, after reading, etc., and found that the mydriasis produced by sitting in the dark raised the tension in the left eye from 34*mm* Hg to 37*mm* Hg in 55 minutes, while the miosis resulting from sitting in the light decreased the tension from 37*mm* Hg to 30*mm* Hg. Reading in the light (accommodation 3 D.) did not produce a further decrease of tension. The normal eye—as a control—also showed changes in tension similar to those occurring in the eye with incipient glaucoma.

CASE 3.—Eye 3. Glaucoma congestivum acutum et coloboma artefactum O. S.

Patient, female, 33 years of age, had about 17 years ago a double optic neuritis following grippe. Vision = 0.5, emmetropic; field is normal in both eyes for white, but reduced for colors in the right eye; disks somewhat pale.

On February 20, 1908, patient comes with an acute glaucoma in the left eye (of three days' duration). A few months ago she had several mild attacks of only a few days' duration. Tension O. D. 23*mm* Hg; O. S. 50*mm* Hg. Eserine is instilled in the left eye. Tension goes down after 5 hours to 43*mm* Hg. Afterwards pilocarpine reduces tension in a few days to 19*mm* Hg. A few months later patient gets a new attack of acute glaucoma and an iridectomy is performed by a colleague. Four months after the operation another attack appeared in the same eye, but it subsided in a few days, yielding to eserine drops. One year after the iridectomy I had the occasion to examine this patient's ocular tension after exposing her to light, dark, reading, etc., and found that in both eyes, the healthy as well as the operated one, the tension was in constant relation with the width of the pupil. When the patient sits in the dark we find the tension in the glaucomatous eye rising 5*mm* Hg in 55 minutes, while after a night of sleep in a perfectly dark room the tension in the morning was 8*mm* Hg higher than on the previous day. The light test shows a lowering in tension of 5*mm* Hg in 55 minutes and of 8*mm* Hg in 1½ hours.

We advised our patient to read much, to be outdoors most of the time, and to avoid the dark. If pains reoccur she should try to relieve them by looking to the sky or reading; and to use miotics only if reading does not help. One month later patient gets a new attack of acute glaucoma. She feels some relief by reading and observes that her vision becomes clearer after reading a little while, but after hav-

ing ceased reading she feels worse. When we examined her we found the entire picture of an acute glaucoma of the left eye. Pupil, 4.5*mm*; no reaction. Right eye normal.

Our tests on this young patient with acute glaucoma show how great an influence reading may have upon the ocular tension. After reading one hour the tension falls from 43 to 35*mm* Hg and another time from 44 to 40*mm* Hg. The diameter of the pupil did not change during the reading, because it was contracted by eserine, but the accommodation was in action (5–6 D.). During one of our tests, when the pupil was reacting, we found a still greater difference in the tension after reading, which fell from 55 to 42*mm* Hg after one hour; but it rose again to the same height after another hour of not reading, although the diameter of the pupil remained the same.

The vision becomes clearer, whenever patient is reading for some time; the rainbow rings and the cloudiness diminish and sometimes disappear entirely. At the beginning she feels a certain discomfort and pain in the eyes, which soon disappeared during the reading.

Eserine acts in a curious manner, more on the sphincter pupillæ than on the musculus ciliaris. During the first two hours after eserine drops there is a spasmodic contraction of the pupillary sphincter and also of the ciliary muscle, and the eye is myopic. After this period the spasm of the ciliary muscle ceases almost entirely, and a slight myopia only persists. On the other hand, the pupil remains contracted for several days. This particularity of action ought to be kept in mind, because eserine must be given quite frequently without regard to the degree of miosis, if we want to keep the tension down.

The change from light to darkness has no constant influence on the tension, while there is an acute glaucoma; only after the acute stage has passed we found in our experiments an appreciable variation in the tension of the patient caused by light or darkness.

The patient remarks repeatedly that a stay out-of-doors or in a light room does not relieve her as much as the reading does. The attack of glaucoma could not be aborted by light, nor did a new attack appear in the period of quietude, after a sleep in a dark room; neither did an attack reoccur after the same test was tried a few days after an acute glaucoma was over. This shows that light and darkness played a minor rôle in the appearance of the attack in our patient with prodromal glaucoma. There are other factors which may diminish or counteract the influence of the accommodation and of the size of the pupils. As eserine acted in this case very slowly, we readily under-

stand how the miosis, produced by light, has had little or no influence on the tension.

CASE 4.—Eye 4. Glaucoma simplex O. S. Patient, 47 years of age, author, calls on March 6, 1909, and says that for about a year the vision in the left eye is gradually failing. No pains, no inflammation, no cloudiness nor rainbow rings perceived around a flame. Field normal and V.O.D. =1; −0.75 sph. −0.75 cyl. V; fundus normal. Ant. chamber 3.9. Pupil reacts well. T. =26*mm* Hg. V.O.S. =0.5; −0.75 cyl. V. The field of vision shows a defect in the upper nasal quadrant extending 3° from the fixation point; below and temporally normal; above only 25°; on the nasal side below the horizontal line 55°; immediately above this line field extends only 3° from the point of fixation. This corresponds to the type described by Rönne (7). Papilla markedly excavated. Ant. chamber, 3.9*mm* deep. Slightly pericorneal injection and corneal cloudiness. Pupil reacts well and is 6.5*mm* wide; T. =77*mm* Hg. Examined in the dark room the patient sees colored rings around the flame for the first time; he sees a dark area around the flame, then a blue, green, and red ring arranged consecutively.

Patient is able to read at a distance of 20*cm* and accommodates with about 3–4 D. He uses no glasses.

We find in this case of glaucoma simplex with a deep anterior chamber that the tension varies slowly, but that reading and the size of the pupils show unmistakably their influence on the tension. In the dark while the pupil dilates, we find the tension rising from 47 to 54*mm* Hg.

Reading (accommodation with 3–4 D.) with contracted pupils reduced the tension from 54 to 41*mm* in one hour and twenty-minutes.

Reading (with dilated pupils) reduced the tension very little. In one test there was no reduction at all, and in another test a reduction of only 4*mm* Hg.

The change from full activity (reading in the light) to complete rest (sitting in the dark) increased the tension from 41 to 50*mm* Hg in two hours and a quarter.

When the patient did not read, the tension was about 50*mm* Hg and no complaints, and no objective symptoms were present. These appeared when the tension was 77*mm* Hg. In this case also the depth of the ant. chamber remained unchanged during all the fluctuations of the ocular tension.

CASE 5.—Eyes 5 and 6. Glaucoma simplex O. A. Patient, female, 69 years old, is seen for the first time by us on August 11, 1909, and complains of pains and occasional

dimness of sight in the left eye. No rainbow rings ever seen. No ciliary injection.

V.O.D. = 0.5 with +1.50 cyl. 180°.

V.O.S. = 0.2 with +1.50 cyl. 180°.

Pupils react well; their diameter is 3*mm* in the light, 7*mm* in the dark. Papillæ excavated, more on the left side. Field of vision of the left eye, after Bjerrum, shows a sector-like scotoma extending to the blind spot.

In this case with simple glaucoma the tension in both eyes was rather high, oscillating between 27 and 42*mm* Hg in the right eye, and between 33 and 52*mm* Hg in the left one.

The mydriasis following a sitting in a dark room raises the tension from 32 to 35*mm* Hg in the right eye and from 37 to 44*mm* Hg in the left eye (after 55 minutes); and from 31 to 42*mm* Hg in the right eye, and from 33 to 49*mm* Hg in the left eye (after one hour and a quarter). The miosis following a sitting in a light room diminished the tension from 35 to 30 in the right eye and from 44–40 in the left one.

Reading in the light diminishes the tension from 30 to 27*mm* Hg in the right eye and from 40 to 35*mm* Hg in the left one.

Reading in the dark raises the tension 5*mm* in the right and 2*mm* in the left eye.

Eserine lowers the tension 19 and 26*mm* Hg.

Patient begins to see colored rings around the flame when the tension reaches 52*mm* Hg. The depth of the ant. chamber remained unaltered during all the fluctuations of the ocular tension.

Case 6.—Eyes 7 and 8. Glaucoma simplex O. S. Woman, 79 years of age, calls for the first time on April 2, 1909, and gives a history of occasionally obscured vision, mostly evenings, as if smoke were in the room. Sight failed gradually. No pains; no rainbow rings around the flames; no inflammatory symptoms. Pupils react well. O.D.V. = 1 with + 1. sph. O.S.V. = 0.5 with +1.50 sph.

Both papillæ excavated, more so on the left eye. Field of vision defective, sector-like on the nasal upper quadrant, reaching 20°–25° from the point of fixation.

Tension, O.D. = 31*mm* Hg; O.S. = 37*mm* Hg.

Our light and dark tests show that the tension is lower while patient is sitting for a time in the light, than when she is in the dark. A stay of 45 minutes in the dark raised the tension 4*mm* Hg; after 40 minutes in the light, the tension went back to 27*mm* Hg (decrease of 4*mm* Hg). The variations of tension were about the same in both eyes. Pilocarpine acted with the same intensity as the light.

We advised our patient to lead an outdoor life, read much, and use pilocarpine every evening.

CASE 7.—Eyes 9 and 10. Glaucoma simplex O. A. Subluxatio lentis et iridodonesis O. S. Diminished reaction of the pupils in both eyes. Man, 64 years of age, was well until a piece of wood struck his left eye about two years ago. Since that time, his sight began to fail in both eyes. Once in a while patient sees (with the left eye) colored rings around the flame; no other acute symptoms appeared.

O.D.V. = 0.5+1 D. and +1 cyl. 180°.

O.S.V. = counts fingers at 5 metres +1 D. and +1 cyl. 180°

No ciliary injection. Pupils react sluggishly to light and convergence; their diameter (in both eyes) is: 3*mm* in the light; 4.5*mm* in the dark; 3*mm* while reading in the light; 1*mm* after eserine.

In the left eye the iris is tremulous, and the lens is subluxated backwards; both papillæ excavated. Field of vision shows a sector-shaped scotoma in the right eye, and a nasally contracted field in the left eye. The tension varies between 26–32*mm* Hg in the right eye and 31–40*mm* Hg in the left one.

No change in tension was registered after the patient remained one hour and thirty-five minutes in the dark; neither was there any change when immediately afterwards, the patient read in the light.

This case is, therefore, entirely different from our previous cases inasmuch as neither light, darkness, nor reading has any influence on the ocular tension. The explanation is probably to be found in the slight variability of the diameter of the pupils. While in the other patients the diameter of the pupils showed variations of 3–4*mm*, the pupils of this patient showed a difference of only 1.5*mm* between the maximum and the minimum diameters. Only eserine reduced the tension 4 and 13*mm* Hg.

RECAPITULATION OF OUR TESTS ON GLAUCOMATOUS AND NORMAL EYES

Light and dark tests: The light and dark tests have shown that the tension in glaucomatous eyes is reduced during the miosis produced by light, and raised during the mydriasis caused by darkness. In Case 7, in which the motility of the pupils was very sluggish, the tension showed no changes during the light-miosis or dark-mydriasis.

In Case 3 with acute glaucoma we found an increase of

tension in both light and dark tests—as soon as the pupils began to contract. This shows that the size of the pupil is not the only factor which determines the degree of the ocular tension. While the pupil in this case was under the influence of eserine and did not react, the tension did not change during the time the patient was sitting in the light, but it was raised about 5*mm* Hg by the dark test. This could be due to the fact that in the dark the accommodation ceases and the tension rises, while it is active in the light and the tension remains lower than in the dark in eyes which are not completely under the influence of eserine. The greatest variations in tension have been in Case 1 with prodromal glaucoma and shallow anterior chamber. In this case the tension seemed to depend directly on the size of the pupil; it went down from 77 to 52*mm* Hg and another time from 65 to 37*mm* Hg. In the other patients with glaucoma whose pupils reacted well, we found the changes in tension produced by the light and dark test much smaller. In nine tests we got a rise of about 6.7*mm* Hg after the dark test, and a fall in tension of 4*mm* Hg after the light test.

Control tests: We instilled several times atropine in the right eye of four subjects and we took the tension of both the right and left eyes the day following the atropinization. We found that the tension in the atropinized eye is almost always higher than in the eye with contracted pupils. The result of 102 tests made on 45 normal eyes seems to indicate that the ocular tension tends to increase during a mydriasis caused by darkness and to decrease during a miosis produced by light. In the atropinized eye no change of tension is produced either through light or darkness. In one case with tabes, where one pupil was not reacting to light, we found no change in the tension either in the light or in the dark; while the other eye with normal reaction of the pupil showed a constant variation in its tension following a light or dark test. The average decrease of tension produced by light was 3.6*mm* Hg, and the average increase of tension produced by darkness was 2.7*mm* Hg.

The depth of the ant. chamber seems to have no great influence on the amount of tension in normal eyes. Age is also of no importance. In persons with normal eyes the

tension is generally the same in both eyes. In the atropinized eye we always get the next day an increase of tension of about 2.7*mm* Hg.

Reading tests: Our reading tests, made with great care in order that the diameter of the pupils should remain the same, showed a considerable decrease in tension in one case with prodromal glaucoma, one with acute glaucoma, and one with glaucoma simplex. In two other eyes with glaucoma simplex, we found only a small decrease in tension after reading in the light. On the other hand, we found no change in tension after reading in the light in one eye with incipient simple glaucoma and in two other eyes with simple glaucoma and sluggish pupillary reaction. Reading in the dark produced almost no lowering of tension.

In normal eyes the tension does not change appreciably by reading. The only important point we would like to note is that in presbyopic eyes reading in the light seems to produce a decrease in tension, while reading in the dark is not accompanied by an increase in tension. In young people with great power of accommodation, reading in the light, and still more reading in the dark, seems to increase the tension. Of course there are exceptions to the above rules.

In a series of experiments made with the purpose of studying the tension in cases where the pupillary sphincter, the accommodation, and convergence have free play, we found, among others, the important fact that in eyes with poor pupillary reaction, when the patient passes suddenly from reading in the light to complete darkness, there was no change in the tension of the eyes, while on the glaucomatous eyes with good reacting pupils, this test always produced an increase in tension.

Relation between the other glaucoma symptoms and the variations of ocular tension: The perception of colored rings around the flame and the pericorneal injection usually go parallel with the increase or decrease in tension. These symptoms appear usually after a lapse of from twenty minutes to several hours from the time the increase in tension takes place. We have the impression that not only the degree of

tension but also the rapidity of increase and the duration of the tension have a great influence upon these symptoms. They do not always appear at the same degree of tension in all the eyes. The depth of the ant. chamber remained unaltered during all the fluctuations of the tension.

Observations made by other authors about the influence which the size of the pupils and reading have upon the ocular tension: Engelmann (28) examined with Maklakoff's tonometer the tension in normal eyes with dilated and contracted pupils, and found that the size of the pupils has no appreciable influence on the ocular tension. We could explain this contradiction to our own findings by the fact that he might not have kept the patients long enough in the dark or in the light before he took the tension. The ocular filtration is very slow (according to Leber it lasts forty-eight minutes), and we cannot expect, therefore, that a change of tension either by miosis or mydriasis should take place in less than an hour. In twenty glaucoma patients examined by Maslennikow (8), with Maklakoff's tonometer, he found that the tension is from 3–23*mm* Hg higher in the morning than late in the afternoon. This is probably due to the prolonged miosis during the daytime.

Schiötz (5) obtained similar results in normal eyes.

These findings correspond with the fact that the prodromal symptoms, as well as the acute attacks, appear mostly in the morning or late in the evening, and more seldom in the middle of the day.

Statistics also show that the attacks of acute glaucoma appear more frequently during seasons of the year when the days are darker [Laqueur (2), Gallenga (9), Steindorff (10), Bauer (11), Maynard (12)].

As regards the favorable influence of reading on the symptoms of prodromal glaucoma, we find in the medical literature only five published cases: One by Cohn (13), one by Sattler (15), one by Schön (16), one by Lange (17), and one by Hirschberg (18). All these observations have been made mostly by accident, as in the majority of cases the patients themselves called the attention of the authors to this curious phenomenon.

The appearance of glaucoma in the second eye soon after the first one has been operated, as noticed at the beginning

of this article, could be explained by the dilatation of the pupils and the relaxation of the accommodation produced by the binocular bandage. The bandaging only of the operated eye may avoid this serious accident.

The appearance of an acute glaucoma after great excitement, sleeplessness, strain, etc., could also be explained by the fact that the above named conditions are accompanied by dilatation of the pupils.

The influence of the mobility of the iris upon the tension: We have seen in the preceding chapters that in both normal and glaucomatous eyes the tension becomes lower during myosis, and that it increases during mydriasis; that reading in the dark (with dilated pupils) produces no appreciable difference in the tension, while reading with contracted pupils produces no change of tension in normal eyes, but a considerable fall in most glaucomatous eyes. Other authors agree with our above-mentioned findings.

How could we explain this phenomenon? When the ant. chamber is very shallow (as in our Case 1), the thickening of the root of the iris, following a dilatation of the pupil, is sufficient to approach it to the posterior surface of the cornea, and to obstruct the filtration angle. Myosis produces the reverse; it thins out the root of the iris and the filtration angle is freed. Besides that, the iris is quite flabby during mydriasis, and it can be pushed forward by the aqueous humor from the post. chamber, while during myosis the iris being on a stretch counteracts the pressure on the post. chamber [W. Czermak (20)].

The rapidity and the great change in the ocular tension in Case 1 give a strong impression that we have to deal here with a valve-like arrangement, which suddenly obstructs the filtration of the aqueous humor and just as suddenly opens its free flow. In cases where the ant. chamber is not shallow, where therefore a thickening of the root of the iris could not obstruct the filtration angle, we could explain the action of the iris upon the tension only when we admit that the root of the iris exercises a certain traction on the ligamentum pectinatum. When the pupil contracts and the iris is on a stretch, the lamellæ of the lig. pectinatum are spread apart and the filtration spaces become larger. Besides that, the

anterior surface of the iris has a certain function of resorption of the aqueous humor [Nuel and Benoit (22–23), Asayama (24), Henderson (39)], and this resorption is more pronounced when the iris has a larger surface, as in myosis, than when its surface is much reduced, as in mydriasis. The ocular tension is influenced in a great degree by the pupillary changes, but not alone by them. The action of eserine on the tension is not due only to the myosis following its use, for Schiötz (5) saw a case with aniridia in which the use of eserine reduced the tension.

We like to affirm our belief that the action of atropine on the ocular tension is due not only to the mydriasis and paralysis of the ciliary muscle alone, but probably also to the change which it produces in the circulation of the eyeball.

The influence of reading upon the ocular tension: Reading may act upon the ocular tension in various ways: by compression of the eyeball by the recti and oblique muscles during the convergence; by the increase in the curvature of the lens through the contraction of the ciliary muscle during accommodation; and probably also by ocular congestion and the consequent increase of the secretion.

Our experiments show that pressure on the eye produces an increase of tension, and that cessation of the pressure reduces the tension, and further that the reduction of tension which follows the cessation of pressure is proportionate to the strength and duration of the pressure. Schiötz found the same thing in his examinations.

Although various authors, Wessely (27), Engelmann (28), Langenhan (29), have proved that the external muscles of the eyes exert a certain amount of pressure on the eyeballs during their action, we found no marked difference in the tension during convergence and parallel position of the eyes. Neither is there any change in the tension produced by associated lateral movements of the eyes. Our findings do not correspond with those of Engelmann, who asserts to have observed an increase of tension of 3–4*mm* Hg in eyes converging to a distance of only 12–15*cm*. The results of our reading tests bring us to the conclusion that the change in the tension of the eyes during reading is not produced by the action of the extraocular muscles. The authors, who do not agree

with us on this point cannot explain why in glaucomatous eyes, reading in the dark should reduce the tension only very little or not at all, as the convergence remained the same as by reading in the light.

Then, this inconstancy in the changes of tension after reading cannot be explained by the authors, who admit that the tension is greatly influenced by the muscular pressure. Why then should some eyes show a change of tension after reading in the light and other eyes should show no change, although the convergence remained the same?

Being compelled to eliminate the convergence as a factor in the variation of tension in reading, we will next consider the influence of accommodation upon the tension. It is generally admitted that the contraction of the ciliary muscles can influence the intraocular tension, by its action on the ligamentum pectinatum and the consequent opening of the filtration spaces [Lange (32), Schwalbe, Henle, Gutmann, Panas and Rochon-Duvigneaud (31), Asayama (21), etc.]. Our study of the tension in eyes during accommodation, excluding the other factors (change in size of the pupils), leads us to believe that the decrease of tension during reading has very much to do with the contraction of the ciliary muscle.

The reading tests on normal eyes gave the following results: The tension in presbyopic eyes changes little, but in the same sense as in glaucomatous eyes—namely, it goes down after reading in the light, and it does not change by reading in the dark. In non-presbyopic eyes, the tension goes up by reading in the dark, and this rise in tension is more pronounced in the younger individuals. It is just in young eyes that we ought to expect a diminution of the tension, because they accommodate so much stronger and the filtration spaces are in consequence wide open. And still the tension increases in these subjects. There must be here some other cause which prevents the diminution of tension. This cause may be found in the ocular hyperæmia and the increase in the secretion of intraocular fluids in the eye during reading.

The physiological relation between the movements of the iris and of the ciliary muscle and the circulation of the intraocular fluids: The constancy with which the ocular tension varies

after the tests in the light, dark, and sometimes after accommodation, points to a certain physiological arrangement in the eye, which has to fulfil a special function. Like any other organ, the eye needs more nutrition when it is active than when it is at rest. When in action the blood accumulates and the lymph is secreted in large quantity in the tissues. The eye rests in the dark; it functionates when if is in the light; the iris and ciliary muscle begin to move, and the retina starts its functions. This is followed by hyperæmia and hypersecretion of the intraocular fluids. The eye being quiet in darkness, a certain amount of anæmia is present, and the secretion is diminished. As all these physiological phenomena happen in a closed capsule with relatively non-elastic walls, it follows that during rest the tension should be lower, and during activity the ocular tension should be higher. But the contrary happens: the tension decreases during work and increases during rest. This shows that there must be some kind of a mechanism which counteracts and compensates the lowering of tension during rest and the increase of tension during the activity of the eye.

As the delicate parts included in the fibrous capsule of the eye cannot stand without injury great changes in tension, there must be in this organ some safety arrangement which should help to carry off the fluids from the eye as rapidly as the rush of blood and secretion come into the eye. We consider the relations between the iris and ciliary muscle and the filtration apparatus for the ocular fluids as the arrangement we just spoke of. As soon as the light strikes the eye, the iris and ciliary body contract, the filtration apparatus becomes wider, the outflow of the liquid is more active, and the tension remains the same. Nature assigned to the iris and ciliary body two opposite functions: one of providing an increased supply of blood and secretory fluids to the eye; and another of providing means of a rapid outflow of these fluids in case of necessity. In other words they are regulators of the ocular tension.

With the aid of these tension regulators the eye can adapt itself to the oscillations of tension during its various functions. Admitting this explanation, we can understand why in our reading tests in the light and in the dark we obtained variable

results: sometimes an increase, sometimes a decrease, of tension. These results depend entirely upon the state in which the filtration or secretion was just before taking the tension—namely, whether the outflow of fluids from the eye was greater than the inflow, or *vice versa*, or whether there was a balance between both.

Let us consider, for instance, the change of the eyes when passing from dark into light. The pupils contract strongly and the filtration channels open. During the muscular contraction the blood-vessels fill up slower and the secretion takes place still slower. When the eyes look at the blue sky, the iris and ciliary muscle remain quiet, and both the blood circulation and the secretion are not very active, while the filtration outflow is much larger. The tonometer will show a decrease of tension. On account of the increased outflow of fluid, the eye is prepared for a larger inflow of blood and increased secretion. Now, when the eye begins to read, a rush of blood and a subsequent increase of secretion will take place. The tonometer will show an increase or a decrease of the same tension, according to the ability of the tension regulators to carry off the outflow as rapidly as the increased amount of blood and secretion rush into the eye. The tendency of young eyes to show rather an increase of tension after reading, while presbyopic eyes become somewhat softer, could be explained by the greater amount of accommodation in young eyes and, therefore, a larger inrush of blood; but the differences in tension are so small that we could consider them also as small errors of technique.

When the eyes pass from light to darkness the pupils dilate and the channels of filtration become narrower; but the inflow of blood and secretion cannot diminish as quickly as the pupil dilates, and therefore the tension remains higher for some time. The tension we find in eyes exposed to darkness depends on the moment we are going to take it. It might be higher, the same, or even lower than the tension exposed to light. Reading in the dark puts the eye in the worst possible condition as regards its nutrition and circulation. The eye is very active during reading; consequently the hyperæmia and increased secretion are at their height. But the mydriasis does not favor the outflow of the fluids as

rapidly as they are rushed into the eye. The tension must rise. We saw this in young normal eyes. The presbyopic eyes, which accommodate very little, escape this increase of tension.

We should not wonder at the apparent contradiction we find in the atropinized eyes which do not always show an increase of tension. The secretion in those eyes is very much reduced on account of the pupillary and ciliary paralysis.

The changes of tension in normal eyes do not last long; a balance is soon established between the in- and out-flow. In glaucomatous eyes the condition is different. Here either the secretion is abnormally increased, or the outflow is abnormally slow. In both cases the balance between these two components is disturbed.

The application of our results in the diagnosis and treatment of glaucoma: The knowledge we have gained regarding the favorable influence of light and accommodation, and of the harmful effects of darkness and relaxation of accommodation on eyes with abnormally high tension is naturally of the greatest importance for the diagnosis of an incipient glaucoma and for the post-operative treatment of glaucoma.

In cases where we suspect an incipient glaucoma, but do not find any increased tension with the tonometer, we could try a similar test to that we have used—namely, to take the tension of the eyes before and after the patient has been in a dark room for a few hours. It may happen that the tension becomes higher, the patient begins to see rainbow-colored rings around the flame, and a pericorneal injection appears. Eyes with a shallow anterior chamber are the most suitable ones for such an examination.

The negative results of such a test do not prove that the patient has no glaucoma, as one of our cases showed. The dietetical rules for patients suffering from glaucoma, as given in the text-books, have to be modified. If the pupils react well, the positive indication is not to avoid the light, as many authors recommend, but to avoid the darkness. We further recommend to our patients with incipient glaucoma to read regularly every day. The ciliary muscle becomes atrophic in glaucoma because it subsides to the general process which affects the whole eyeball. According to the general experience,

a muscle becomes atrophic by non-use, not by work. Overwork makes a muscle hypertrophic. We believe that a systematic activity of the ciliary muscle counteracts a weakening and atrophy of this organ, as it usually appears in glaucoma. The systematic calling into function of the ciliary body also tends to reduce the tension in the eye, and, by doing this, it also prevents to a certain degree the atrophy of the ciliary muscle. We conclude our study by insisting upon this important suggestion that the binocular bandage and rest in darkness after glaucoma operations are harmful. If we bandage both eyes, it is a good plan to instil myotics in the non-operated eye before and after the operation, mostly when this eye shows some passing increase in tension (appreciable only by use of the tonometer).

Conclusions: The tension rises during mydriasis and decreases during myosis in glaucomatous eyes, and appreciably in normal eyes.

An effort of accommodation reduces the tension in most glaucomatous eyes. Mydriasis may counteract the tension-reducing action of the accommodation.

The tension does not vary in normal eyes when they accommodate; but during greater efforts of accommodation it seems to have the tendency to rise somewhat.

The convergence does not produce any increase of tension measurable with Schiötz's tonometer.

The changes in tension, which the eye undergoes during the activity of the ciliary muscle and of the iris, are probably due to the opening of the filtration channels during the contraction of the pupils and during the accommodation, and to the narrowing of these channels during the relaxation of the accommodation and dilatation of the pupils. The fluctuation of the tension is also produced by the increased circulation (in- and out-flow) of the ocular fluids (blood-secretion) during the activity of the intraocular muscles and by the diminished circulation in the eye during the period of rest.

The same muscles, sphincter pupillæ and m. ciliaris, which provide for the increased blood supply and secretion in the eye, provide also for the increased outflow of these fluids from the eye in normal conditions.

The glaucomatous eyes must be protected from darkness

and long rest. Staying in light rooms and reading are to be strongly recommended as long as their pupils react well.

After a glaucoma operation we have to instil myotics in the non-operated eye, and if we do not use a myotic, to avoid keeping the patient in a dark room or bandaging both eyes.

In cases of suspicion of glaucoma with no increase of tension, we could test it after keeping the patient for a few hours in the dark, when we might find an increase of tension. A negative result does not exclude glaucoma. Pressure, massage, and pressure bandage of the eyes are followed by hypotony immediately after the cessation of the pressure. Lateral movements do not influence the degree of tension in any way.

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REPORT OF THE PROCEEDINGS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

By Mr. C. DEVEREUX MARSHALL.

An ordinary meeting of the Society was held at the rooms of the Medical Society, Chandos Street, Cavendish Square, on Thursday, July 13, 1911, Dr. Ernest Clarke, Vice-President, in the Chair.

Mr. J. B. Lawford showed a case of **subretinal new growth of doubtful nature,** in a healthy lady, aged 77. Mr. Holmes Spicer believed it was a case of central senile degeneration. Such instances were not common in old people. In a similar case he believed the condition was inflammatory, the deeper layers of the choroid being exposed. Mr. Nettleship believed that if such cases could be watched throughout their history there would be found to be a deposit in a considerable proportion of them, and that the deposit disappeared and left a corresponding area of atrophic choroid. Such cases should be carefully watched. Mr. Lawford replied, expressing the view that the opinion given was favored by the fact that since March 18th there had been no increase in the size of the growth, and the only portion of the choroid in which there was some pigmentary change was the lower and inner part.

Mr. Arnold Lawson showed a case of **medullated nerve fibres near the macula and apart from the optic papilla.** Mr. Frank Moxon showed a case of **hole at the macula.**

Mr. G. W. Roll showed a case with a **clinical appearance simulating growth in the eyeball,** and Mr. Greeves read notes on a **section of tumor of the ciliary body.** Mr. Treacher Collins agreed with Mr. Greeves's conclusion, but from the position occupied by the cells it was impossible to say exactly what the growth was.

Mr. R. R. CRUISE showed a case of **central retinal detachment,** which had been previously shown three and one-half months previously. He also showed a case of **exostosis of orbit after operation,** and the Chairman congratulated him on the result.

Mr. W. H. MCMULLEN showed a case **of retinitis circinata,** and Mr. HANSON and Mr. FISHER exhibited a case of **gummatous tarsitis.** In spite of injecting "606," Wassermann reaction was positive. Mr. DIMSDALE showed a case of **retinitis of doubtful origin.**

Mr. ARNOLD LAWSON read a paper entitled **Two cases of metastatic ocular inflammation in association with bacillus coli toxæmia.** Mr. Lawson gave the following particulars of the cases:

CASE 1. This was a case of a young lady, aged 21, who suffered from a very intense optic neuritis of one eye. The inflammation was the most severe example of monolateral papillitis that the writer has ever encountered. The general health of the patient was not obviously affected, and all the organs were quite healthy. Syphilis could positively be excluded, and there was no evidence of tubercle, either in the patient herself or in the family history. The housemaid in the patient's house had, however, noticed for some months that the bedroom in the morning always smelt abominably, and it was discovered that this odor was due to the offensive condition of the urine, which was found to be swarming with bacillus coli. Full doses of helmitol were prescribed, which effected rapid improvement, and, consecutive with the satisfactory change in the urine, the papillitis also subsided rapidly. Mercury by the mouth and by inunction was also given, but mercurial treatment was not well borne, so that after about a fortnight all internal administration of mercury was stopped, and the treatment then consisted of a little mercurial inunction at night, combined with full doses of helmitol. Expert advice was sought with regard to the preparation of a vaccine, but as improvement had set in so rapidly after the commencement of the helmitol, it was deemed unnecessary, especially as at that time (three years ago) coli vaccines had little determined value. The progress of the case was extremely satisfactory. The patient recovered with $\frac{6}{6}$ vision and a good visual field,

excepting that a somewhat large sector of the field at one spot was obliterated, elsewhere the limits of the field were full and normal. Helmitol was continued for about three months, and at the end of this time a specimen of urine submitted to the microscope contained no bacillus coli.

CASE 2. The patient was a woman, aged 36, afflicted with severe chronic rheumatoid arthritis, and subject to recurrent attacks of vesicular keratitis, which usually cleared up under ordinary straightforward treatment. Some months ago she was taken into Moorfields Hospital by the writer on account of the unusual obstinacy of one of these attacks. She then speedily recovered, but just before it was determined to send the patient out of hospital, another bad attack set in. The little corneal ulcers in one eye were then scraped for bacterial investigation under due aseptic precautions, but within a few hours of the scraping a very violent muco-purulent discharge commenced in this eye, rapidly followed by an infiltration of the cornea with dense exudate. This infiltration spread in spite of all treatment, and so quickly that four days later the whole cornea was involved, and stained freely to fluorescine. About this time the other eye commenced to exhibit a similar train of symptoms. A profuse muco-purulent discharge was also rapidly followed by ulceration and infiltration of the cornea, and five days later, corresponding to the ninth day of the injection of the first eye, the condition of the latter seemed hopeless and that of the other eye was almost as bad. Two careful bacteriological examinations of the conjunctival discharge revealed nothing but the presence of the bacillus xerosis. There was no sign of gonorrhœa about the patient and no history of any previous attack of this disease. The urine was, however, offensive and swarming with various organisms. On the fifth day of the primary infection, a mixed vaccine of streptococcus B. catarrhalis and gonococcus was tried without effect, and on the seventh day, as matters were getting desperate, the writer suggested an examination of the urine for B. coli. This organism was found present in vast numbers, and a vaccine of B. coli was then prepared and injected on the ninth day. Urotropine in full doses was also ordered. A very rapid improvement at once followed the injection of the B. coli

vaccine. The conjunctival discharge rapidly decreased, and the corneæ began to clear up. Six days later the corneæ were almost covered by epithelium and the infiltration was already far less dense. From this time, in short, the patient made rapid strides to complete recovery, so that seven weeks after the onset of the inflammation the vision was as good as when the patient first came into the hospital. Altogether, five injections of the vaccine were given, commencing with five millions, the last two injections each containing one hundred millions. The bacilluria rapidly improved after the first injection. These cases were both very similar in many points, remarkable features being the intense virulence of the inflammation in each case, the exceptional rapidity with which the inflammation subsided, and the extreme completeness of the recovery. The rapid convalescence of the ocular trouble coincided with the improvement in the bacilluria in both cases, and the association of the two cannot reasonably be doubted. The author believed that these two cases were the first recorded examples of ocular inflammation associated with bacillus coli toxæmia, but it was probable, he said, that the association was not so very rare, but that it had been overlooked in the past.

The CHAIRMAN considered that the paper was one of the most important which had been read before the Society that session. Probably ophthalmologists had constantly missed such infections because they had not employed ordinary methods of induction. Mr. W. M. BEAUMONT endorsed the Chairman's remarks, and added that the injections apparently cured the eyes but not the urine. Mr. MAYOU asked whether the organism was found in the discharge from the eye. Mr. LAWSON, in reply, said the continued presence of the bacilli in the urine might have been expected, as the organism was frequently found in healthy urine. The first patient was a refined girl of good family, in whose urine the organism was swarming. The body could stand the presence of the coli bacillus without harm, unless there was a considerable invasion. The organism was not found in the discharge from the eye.

REPORT OF THE PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY OF THE BRITISH MEDICAL ASSOCIATION.

By Mr. C. DEVEREUX MARSHALL.

BIRMINGHAM MEETING, WEDNESDAY, JULY 26, 1911. HENRY EALES, M.R.C.S., PRESIDENT, IN THE CHAIR.

DISCUSSION ON THE OPERATIVE TREATMENT OF GLAUCOMA.

After some opening remarks by the President, Mr. Priestley Smith opened the discussion with the question: Ought we to adhere to the time-honored iridectomy of von Graefe for glaucoma, or should we adopt one or other of the substitutes lately introduced? If the latter, which was it to be? Or ought we to employ sometimes one method, sometimes another, according to the type and stage of the glaucoma? By means of the lantern he demonstrated the conditions which confronted the operator: the relation of the limbus—the operator's landmark—to the hidden parts beneath it, and the uncertainties which beset the placing of the incision. Success after a glaucoma operation was sometimes due to restoration of normal filtration; more frequently to the establishment of abnormal filtration—to a filtering scar. The principle, was not new. Many had maintained it, and aimed at making filtration scars. Pre-eminent among those who had devised sure and safe methods were Herbert, Lagrange, Elliott, and Fergus. A definite and highly important advance, especially in the treatment of chronic glaucoma, had been made. He asked the experience of the members on certain points; those relating to acute glaucoma, absolute glaucoma, and the advantage of an auxiliary scleral puncture.

Major R. H. Elliott, I.M.S., read a paper entitled **Obser-**

vations on trephining the sclera. The simple trephining operation which he advocated had now been performed in 408 cases in Madras. By this means they established a direct entry into the anterior chamber with the least possible disturbance to the iris and surrounding tissues. He was in the habit of turning forward a large conjunctival flap, and continuing the dissection so as to split the cornea for the depth of one millimetre; then the trephine was used to cut out a small disk, half cornea, and half sclera, from the margin of the limbus. In his experience a trephine *2mm* in diameter was the best. Care must be taken not to buttonhole the conjunctival flap. As regards the risks of the operation, the disk might fall into the anterior chamber if too much force were used. In his experience that accident did not matter, and it was unwise to seek to remove the lost disk. In five per cent. of his cases there had been escape of vitreous. Sixteen of them were in desperately bad eyes, where every risk was intensified. In a large number of cases iridectomy had been done conjointly with the trephining, in nearly fifty per cent. In some cases this procedure had been followed because the iris tended to advance into the hole, but that was not always so. For secondary prolapse, iridectomy had been done in seven cases. He was disposed to perform iridectomy in most cases merely as a mechanical safeguard, and not as enhancing the effects of the operation. He then showed, by means of diagrams, the different effects of the trephining, according to the state of the angle of the anterior chamber and the root of the iris. In conclusion, he maintained that, granting the necessity for removing a piece of the sclera to establish filtration, or filtering scars, trephining was the simplest and best operation.

Mr. THOMSON HENDERSON said that their practice must be based on a rational physiology. The success of iridectomy as a means of relieving tension was established; but it was an empirical procedure, and it remained for them to put it upon a rational basis. That could only be done by an investigation of the circulatory conditions of the eye, such as he had indicated in his experiments and the deductions therefrom, and the experiments upon cerebral and ocular circulation by Dr. Leonard Hill. The key to the mystery was the fact that

intravenous and intraocular venous pressure were always essentially the same.

Mr. H. H. HERBERT (Nottingham), discussing the appearance of scars after iridectomy for glaucoma, said that only those scars which were absolutely invisible could with safety be asserted as solidly united. It was possible in almost all other scars to show that over them there was an abnormal conjunctival œdema, and that there was filtration from the eye through the scar into the subconjunctival tissue. He showed a section, kindly lent him by Mr. Affleck Greaves, in which the scar was partly filled with loose fibro-cellular tissue, and in which serial sections had proved the absence of a fistula, yet in that eye there had been œdema over the scar. It was confessedly easy to obtain a reduction of tension in an eye by sclerotomy, but the defect of that procedure was the want of control in the degree of reduction: eyes tended to get soft. The question was how could they best secure control over filtration, by sclerotomy or sclerectomy? He thought by sclerotomy. As yet the method was in its infancy, and its possibilities had been, as yet, imperfectly explored. For instance, numerous modifications of the small-flap operation at once suggested themselves, should variation prove necessary. In hard blind eyes, sclerotomy at present often proved efficient only in removing pain, the tension being imperfectly reduced, at least for a time. And there were a few secondary glaucomas in which the need of freer filtration was obvious.

Dr. J. GRAY CLEGG (Manchester) read a paper entitled **Observations on trephining the sclera.** In recent years he had done several operations other than iridectomy for chronic and acute glaucoma, such as Gayet's, Herbert's wedge, and Lagrange's operations, but with only moderate success. The reaction from these operations was rather violent, and there was some uncertainty as to the size of the sclerotomy in the last-named operation. Succeeding these operations, he had performed trephining twenty-three times, with the most satisfactory results, and he considered the operation suitable for all types of primary glaucoma. The improvement obtained in visual acuity was striking; such a change as the restoration of $\frac{6}{6}$ after it had been reduced to fingers, was not

rare. As to risks of the operation, he had found few. There had been no escape of vitreous. Prolapse of the iris at the moment of trephining had occurred four times, necessitating iridectomy. There had been secondary bulging of the iris once, and of the ciliary body twice. He gave detailed tables of his cases. In one case of sympathetic ophthalmitis with persistent tension, trephining was very successful, and gave rise to no undue reaction.

Mr. DEVEREUX MARSHALL (London) said he was surprised to hear Mr. PRIESTLEY SMITH say that malignant glaucoma did not occur after a preliminary scleral puncture. In acute cases his inclination was distinctly in favor of iridectomy, which had stood the test of time in a way which no other had, while he was quite satisfied with its results. He had performed Herbert's operation many times in chronic glaucoma, and occasionally in subacute cases, but we had yet to wait to ascertain the permanency of the result. He had not performed the operation of trephining, and so could not speak from experience as to its merits.

Mr. RICHARDSON CROSS (Bristol) said that without question physiology and pathology must be at the basis of our conception of treatment. In his view, the work of Weber and that of Priestley Smith had established the primary facts of the importance of the filtration angle; and whilst he congratulated Mr. Thomson Henderson on his work, and hoped he would continue it, as yet he could not say his faith in the older theories was disturbed. In acute glaucoma, there could be no question that iridectomy was the best operation, and that operation was the only treatment. Chronic glaucoma was a different condition; the most perfect iridectomy might fail to relieve the tension permanently. He had always tried to make his incision a long shelving one, commencing, say, *2mm* back from the limbus. In a number of cases of hypophthalmos he had had remarkably successful results by doing Herbert's small-flap sclerotomy with Bishop Harman's twin scissors; and he was of opinion that for these cases it was preferable to iridectomy. As a rule, he would continue to do iridectomy in simple and chronic glaucoma, as well as in acute cases; but should tension recur, he would use the sclerotome, preferably Bishop Harman's. He had had good results

in primary sclerotomy in cases of hydrophthalmos, and he much preferred it in these cases to iridectomy.

Dr. ADOLPH BRONNER (Bradford) said he had tried various methods of operating for glaucoma. In acute and subacute conditions he performed posterior sclerotomy first, if possible, and then he did iridectomy. If tension recurred, he used the trephine. In chronic cases, he still preferred iridectomy, except in cases of arterio-sclerosis and increased blood pressure in feeble and nervous patients; then he trephined. He showed a modified form of trephine, which he found convenient in use. It had an outer sheath, which steadied the trephine in boring, and prevented its wobbling.

Mr. BISHOP HARMAN (London) wished to consider the merits of these operations from the patients' point of view. Granting, for the sake of argument, equal value in iridectomy, sclerotomy, and sclerectomy, which operation was most commendable from the point of view of the patient's general condition? For acute glaucoma, he believed undoubtedly iridectomy. The condition was severe, and demanded an operation which, even though severe, was undoubtedly reliable. In chronic glaucoma, the case, although serious enough, might not present so formidable an aspect to the patient's mind; the loss of vision might be small, or only occasional, even the field might be but little affected, and with such cases the prospect of laying open the eyeball, confinement to bed for at least a week, with the certainty that considerable astigmatism would ensue, together formed no attractive prospect. The confinement in bed alone was a serious item in old folk. These considerations had deterred not a few surgeons from advising operation in times past, and favored the use of myotics by them. Contrast with these risks the simplicity of the procedure in Herbert's operation, the one with which he was familiar, and the advantages became manifest. There need be no pain at the operation, the risks of injury to the eye were the smallest, and he did not hesitate to permit patients to sit up in bed the day after the operation, so that the disturbance of an old person's condition was as little as possible. Lastly, very little, sometimes no, astigmatism was caused by the operation. In the rare event of failure to secure a permanent lowering of tension,

it was easy to repeat the operation. Indeed, he proposed this week to do a third operation upon a patient in one of whose eyes the benefit of the previous operations had not been maintained. This case was of interest, for the man's sclerotics were extraordinarily tough and gristly, so that the flap produced had very little pliability. He thought that in such cases the tip of the flap should be excised, as had been suggested by Herbert. The difference between the texture of the sclerotic and its effects upon operative procedure was worth considering.

Mr. W. H. JESSOP (London) said that the discussion was one of greatest importance. He considered there were great differences in acute and chronic glaucoma. In acute, the large peripheral iridectomy, preceded, if necessary, by a posterior scleral puncture, was the proper procedure. In chronic glaucoma, iridectomy was frequently of little use, and often even dangerous, and it was in these cases he now performed Herbert's iridectomy, in preference to that of Lagrange. He had no experience of trephining, but intended to try it.

Mr. CHARLES WRAY (Croydon) said that, admitting all that was claimed for the new operations to be true, his early experience of operations in chronic glaucoma left him doubtful of the advantage of operation over the continued use of myotics. He had cases which had maintained their stand for fifteen to thirty years, and that apart from risks such as soft eyes and detached retina.

Mr. HARRISON BUTLER (Coventry) had tried Elliott's operation, with satisfactory results. He had had difficulty in getting trephines that would cut. So far, Freeland Fergus's had proved the best. He had had difficulty by reason of the disk of tissue falling into the anterior chamber. One point he thought should be called attention to, and that was the grave risk attaching to operations upon eyes in which the periphery of the field approached the fixation spot. Operation might secure a permanent fall of tension, but it was liable to cause loss of macular vision. On the question of the circulation of the eye, it was interesting to notice that a recent German author had brought forward a series of observations upon which he based the theory that there was no

intraocular circulation at all. Then there were the observations of Professor Thompson, which indicated that it might be limited to the small pump-like action of the scleral spur.

Mr. JAMESON EVANS (Birmingham) said he had looked up the hospital notes of the last two or three years' cases of glaucoma. He found nine acute and three absolute cases, for all of which iridectomy was performed; five subacute and thirty-three chronic cases for which filtration operations were done, half Herbert's wedge, and the other half trephining. His general conclusions were in favor of iridectomy for acute glaucoma, and trephining, with or without iridectomy, for chronic cases. Trephining was, in his experience, the easiest operation, and caused the least reaction. It was easy to repeat it, and no disfigurement ensued. He did not think the œdema over the scar a sure proof of the amount of drainage.

Mr. WILFRED ALLPORT (Birmingham) had performed forty operations after the fashion of Herbert's wedge operation, mostly in chronic cases, with excellent results in every case but one. For acute glaucoma, no scleral operation was so satisfactory as scleral puncture followed by iridectomy.

Dr. GRAY CLEGG considered trephining good and safe for acute glaucoma, and instanced his four successful cases.

Mr. JOHN HERN (Darlington) said that were he to put himself in the position of the patient, as suggested by Mr. Harman, he would certainly prefer a peripheral wide iridectomy for acute or chronic glaucoma, as against any of the newer scleral operations. With the incision placed well back in the sclera, as had been described by Mr. Cross, this was the best guarantee of success.

Dr. H. MACCALLAN (Cairo) said the condition of the iris should determine the choice of operation. If the iris was atrophied, then the possibilities of absorption were diminished, so that something else than iridectomy was required.

Mr. CLAUD WORTH (London) said, in his view, atrophy of iris was not so important as the possibility of the existence of adhesions of the iris at the filtration angle. Where those existed, iridectomy was almost certain to fail.

Mr. SECKER WALKER (Leeds) said that for acute glaucoma he believed in iridectomy, but he had no faith in it for chronic glaucoma. He got better results with Lagrange's operation

than with iridectomy, and better still with Herbert's operation, which he now relied upon. The small-flap operation he found comparatively easy to do. Quite painless, it gave excellent results, and it could be repeated in case of only partial success.

The PRESIDENT recalled the days when cocaine was unknown, and how on occasions they had to perform iridectomy in acute glaucoma without even a general anæsthetic. Once he operated upon both eyes at a sitting under these conditions.

Major ELLIOTT, in reply, said that, if looked for, it was as easy to find pitting of the conjunctiva as pitting of the shins in œdema of the legs. He advocated trephining for acute, as well as for chronic glaucoma. He maintained it was a safe procedure, while iridectomy was not. It was not necessary to perform scleral puncture to make it safe or enable it to be performed, as was the case with other operations. In fact, the harder the eye, the easier the trephining; and there was no risk, with ordinary cases, that the aqueous would escape too rapidly. The occurrence of quiet iritis had been referred to. It certainly followed trephining, though he doubted if it was true iritis. But it could be prevented by the routine use of atropine on the third day. Iridectomy he held advisable in trephining, but merely for its mechanical effects. As to the discussion between Herbert and himself, it came to this: Herbert considered trephining did too much, whilst he (Elliott) thought sclerotomy did too little. He could confirm Mr. Bishop Harman's observations concerning the differences in the texture of the sclera of patients.

Mr. PRIESTLEY SMITH, in reply, said he had a great admiration for Mr. Thomson Henderson's work, but could not follow him in his conclusion that cerebral and ocular pressures were always the same. Did he mean that when ocular pressure was thrice what it ought to be, the brain was subjected to a similar excess pressure, and that without any symptoms? The problem they had to consider was, how to secure a filtration scar that would be best for the majority of cases. Lagrange, Elliott, and Fergus removed pieces of the sclera. Herbert displaced a piece. The apparent test was the production of œdema. The true test was not apparent œdema, nor the tension, nor the visual acuity, but the field of vision as mapped out with the perimeter.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE THIRD AND FOURTH QUARTERS OF THE YEAR 1910.

By Dr. G. ABELSDORFF, in Berlin; Prof. ST. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin; with the assistance of Prof. A. ALLING, New Haven; Prof. E. BERGER, Paris; Prof. CIRINCIONE, Genoa; Dr. DALÉN, Stockholm; Prof. HIRSCHMANN, Charcow; Dr. J. JITTA, Amsterdam; Mr. C. DEVEREUX MARSHALL, London; Dr. H. MEYER, Brandenburg; Dr. P. VON MITTELSTÄDT, Metz; Dr. H. SCHULZ, Berlin; Prof. DA GAMA PINTO, Lisbon; and others.

Edited and Translated by Dr. MATTHIAS LANCKTON FOSTER.

Sections I.–III. Reviewed by Prof. C. HORSTMANN, Berlin.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

172. SATTLER, H. **Basedow's disease.** *Graefe-Saemisch's Handbuch der gesamten Augenheilkunde.* Second revised edition, part ii., volume ix., chapter xiv. Leipsic, W. Engelmann, 1910.

173. ROEMER, PAUL. **Textbook of ophthalmology in the form of clinical lectures.** Urban and Schwarzenberg, Berlin and Vienna, 1910.

174. AXENFELD, THEODOR. **Textbook of ophthalmology.** Second edition. G. Fischer, Jena, 1910.

175. FUCHS, ERNST. **Textbook of ophthalmology.** Twelfth enlarged edition. Leipsic and Vienna, J. Deuticke, 1910.

176. MARKOW, J. E. **Investigation of the vision of the pupils in the three intermediate schools of Samara.** *Westn. Ophthalm.*, 1910, No. 6.

177. WALKER, A. N. **Two years' experience of the ophthalmia neonatorum department of St. Paul's Hospital, Liverpool; with remarks on treatment and results.** *Ophthalmoscope*, Feb., 1910.

178. POSEY, W. C. **Visual requirements in the public services of the United States.** *Jour. Amer. Med. Assoc.*, Aug. 13, 1910.

179. MINOR, J. L. **Some impressions of certain eye affections in the negro as compared with the white race.** *Trans. Amer. Oph. Soc.*, 1910.

180. VEASEY, C. A. **Some unusual ophthalmic cases.** *Annals of Ophthalm.*, Jan., 1910.

181. CLAIBORNE, J. B. **Some things that have happened to me in my operative career.** *Ophthalmology*, July, 1910.

182. MARKHAM and WOOD-ABRAHAMS. **The responsibility of opticians.** *Ophthalmoscope*, Dec., 1910.

SATTLER (172, **Basedow's disease**) first describes the different forms of exophthalmic goitre. A complete and an incomplete form are differentiated. The former is represented by the typical and classical disease; in the other, one or more principal symptoms are absent during its entire course, or at least during a long period. Sometimes the cardiac symptoms are absent, sometimes the swelling of the thyreoid gland, sometimes the exophthalmos. Cases occur in which cardio-vascular symptoms, usually more or less distinct tremor, tendency to sweat, and isolated nervous symptoms, are added to a goitre. Symptoms of this disease may also appear in carcinomatous or sarcomatous degeneration of the thyreoid gland. Cases occur in which the cardio-vascular and nervous symptoms are more or less veiled, while the eye symptoms chiefly attract attention. Women are markedly more predisposed to this disease than men; it may come on at any age, even in childhood.

The fairly exhaustive work of ROEMER (173, **Textbook of ophthalmology in the form of clinical lectures**) is primarily fitted for students. Roemer has tried, by the use of popular language, to make the individual questions of ophthalmology as clear as possible to them. The science of ophthalmology is treated in a detailed, understandable manner in nineteen chapters, and the work is to be recommended not only to students, but also to those of our colleagues who are interested in ophthalmology.

The fact that AXENFELD'S (174, **Textbook of ophthalmology**) work has reached its second edition within two years is the best proof of its popularity. The new edition contains noteworthy additions. Professor Oeller has been added to the collaborators and his paintings are reproduced on lithographed plates.

No other ophthalmological textbook has received the widespread recognition that has been granted to that of FUCHS

(175, **Textbook of ophthalmology**). It appeared first in 1889 and has now reached its twelfth edition, in which have been gathered for the first time in a general introduction the teachings concerning the eye as a whole and its metabolism, together with the general grounds of etiology and treatment, which have hitherto been scattered through the different chapters. The most important recent acquisitions likewise receive notice.

MARKOW (176, **Investigation of the vision of the pupils in the three intermediate schools of Samara**) investigated the vision, refraction, and health of the eyes of the pupils in a commercial school (395 pupils), a technical school (378 pupils), and a girls' school (612 pupils), in all 1385 pupils. His conclusions are: (1) The existence of a professional or school myopia must be acknowledged. (2) School myopia is a common disease; there is no doubt as to the influence of study upon its development, while the influence of heredity, race, and sex is at present difficult to determine. (3) The development of school myopia is directly proportioned to the amount of reading and writing. (4) The law discovered by Cohn, of the increase of the degree of myopia and of the number of myopes with the age, and the observation of Erismann, of the change of hypermetropia through emmetropia to myopia, are confirmed. (5) The increase in the number of myopes between the ages of 13 and 15 is especially marked. (6) The percentage of myopia agrees with the increase of the general culture. This percentage is beginning to decrease with the spread of hygienic knowledge and improvement of the economic conditions among the classes of people that send their children to these schools. (7) The work at home in the evening is more harmful than that done in the school. (8) Inflammatory, congenital, and acquired myopia needs local and general treatment. (9) In these three schools 86% have a vision of from 2 to 1 without glasses; the number of myopes averages 8.5%, diseases of the eye 1%. HIRSCHMANN.

WALKER, A. N. (177, **Experience in wards for ophthalmia neonatorum**). The first year's work was recorded in *The Ophthalmoscope* for June, 1909, and abstracted in this Journal. The department was instituted in Jan., 1908, when a ward

with three beds and cots was opened, so that both mother and child could be admitted. The number of cases admitted was 75 in 1908 and rose to 142 in 1909. An extra bed and cot have now been added, but this is insufficient, for cases still have to be treated as out-patients who should be admitted.

The first point to be emphasized is the leading position taken by the gonococcus. It was responsible for 71% of the cases. The second point is that the gonococcus is practically the only dangerous organism. Thirdly, early recognition in the prepurulent condition is essential in order that adequate treatment may be begun at once. The general principles of treatment are (1) Free drainage. (2) Frequent and thorough removal of pus. (3) Early operation to anticipate complications. (4) Maintenance of the general resistance of the patient. To facilitate drainage, warm wet dressings covered by jaconet are of great value. Normal saline is used at first, but later lobic sodiæ bicarbonatis, 3 j to O j, is better. Silver nitrate 1% is valuable, to which 20% of glycerine may be added. As soon as the cornea gets hazy, kerotomy is performed. Breast feeding should be continued. The results obtained were in 284 eyes: in 250, cornea intact; in 24, cornea more or less damaged; in 10, no record. These records show a marked superiority over those of home treatment.

T. HARRISON BUTLER.

POSEY (178, **Visual requirements in the public services of the United States**), in association with three other ophthalmologists, at the request of the Surgeon-General of the Army, has studied the demand upon vision in each corps of the army. The visual standards in operation in armies abroad were also considered, and a report was drafted which has received the approval of the Surgeon-General and will shortly be submitted by him to the General Staff for adoption. His paper gives a complete review of the present requirements for the various corps and departments. The importance of more stringent examination of visual acuity of pilots is emphasized, and co-operation with the Department of Commerce and Labor and with the Marine Hospital Corps is urged.

ALLING.

MINOR (179, **Some impressions of certain eye affections in**

the negro as compared with the white race) has never seen myopia in the negro except in two cases of mulattoes, and only three cases of astigmatism. Hypermetropia is infrequent and never of high degree. He has never examined a single case of strabismus although he has observed a few. Glaucoma seems to be more frequent than in the white. His observations lead him to believe that trachoma is fully as common as in the white race—an absolute contradiction to the common impression. Iritis is apparently usually not of severe type. ALLING.

VEASEY'S (180, **Some unusual ophthalmic cases**) cases are as follows: (1) Case of horizontal nystagmus, able to read only when printed lines are held vertically. The explanation appears to be that the letters do not so easily run together in this position. (2) Small pedunculated papilloma at sclerocorneal junction. (3) Flat pedunculated growth about the size of a pea attached to the caruncle. (4) Sarcoma of the chorioid discovered after enucleation of a blind and painful eye. There was an orbital cellulitis present, but it subsided after the eye was enucleated. (5) Metastatic panophthalmitis following pelvic abscess. Although no bacteriological examinations were made, the infection was supposed to have been gonorrhœal. The eye ruptured spontaneously and was enucleated, but no examination was made. ALLING.

Among CLAIBORNE'S (181, **Some things that have happened to me in my operative career**) experiences are included two explosions on the eve of operation, from careless handling of ether and alcohol, various accidents with obstreperous patients, seven suppurations, and one chorioidal hemorrhage in 250 cataract operations. He extracted one lens, without accident, in thirty-three seconds, although he does not state that such haste is generally advisable. He favors general anæsthesia in cataract extraction. ALLING.

MARKHAM and WOOD-ABRAHAMS (182, **Responsibility of opticians**). This case is of great importance to the sight-testing optician. A Miss Markham, consulted one of these men, Wood-Abrahams, who prescribed glasses, but failed to

diagnose a commencing conical cornea. In consequence of this neglect she stated that she had become almost blind. Expert evidence was called on both sides and in the end the jury disagreed. It is rather difficult to see that the optician was to blame. Opticians are not supposed to diagnose disease, and had this one done so, how could the condition have been remedied! As far as we know there is no method of preventing the steady advance of a conical cornea.

We believe that the case is to be retried.

T. HARRISON BUTLER.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND TREATMENT.

183. HESS, C. **Tuberculosis of the eye.** *Med. Klinik*, 1910, No. 33.

184. HAYASCHI. **Experimental researches concerning the aptitude of the eye to infection in diabetes and the bactericide action of the diabetic blood serum upon pus agents.** *Arch. f. Ophthalm.*, lxxvi., 1, p. 159.

185. WEEKS, J. E. **The status of vaccine therapy in ophthalmology.** *Jour. Amer. Med. Assoc.*, July 23, 1910.

186. DERBY, G. S. **Vaccine and serum therapy in ocular therapeutics.** *Trans. Amer. Ophthalm. Soc.*, 1910.

187. FILATOW, W. P. **The influence of blood sera upon the eye.** *Westn. Ophthalm.*, 1910, No. 7–8.

188. FILATOW, W. P. **The bacillus subtilis as a pathogenic agent.** *Westn. Ophthalm.*, 1910, No. 16.

189. BURK, A. **The clinical, physiological, and pathological signification of fluorescence of the eye after the administration of uranin.** *Klin. Monatsbl. f. Augenheilkunde*, xlviii., ii., 4, p. 445.

190. REBER, W. **The ocular palsies associated with induction of spinal anæsthesia with various solutions, with a report of five cases.** *Jour. Amer. Med. Assoc.*, July 30, 1910.

191. IGERSHEIMER, J. **The relations between scrofulosis and the phlyctenular inflammations of the eye.** *Klin. Monatsbl. f. Augenheilkunde*, xlvii., ii., 5–6, p. 593.

192. BAXTER, E. J. **A case of loss of vision following a small dose of santonin.** *Lancet*, 1910, vol. ii., p. 1693.

193. PICHLER, A. **Ammonia burn of the eye and the neighboring skin.** *Zeitschrift f. Augenheilkunde*, xxiii., 4.

194. MOTOLESE, F. **Picric acid in ocular therapeutics.** *Annal. di Ottalm.*, 1909, No. 8–10.

195. MARZORATI. **The use of picric acid in ophthalmology.** *La Clinique*, Dec. 3, 1910.

196. HENDERSON, P. L. **Blindness due to the administration of synthetic arsenical compounds.** *Amer. Jour. of Ophthalmology*, Nov., 1910.

197. HESSE, R. **The influence of Ehrlich's new syphilis therapy on syphilitic diseases of the eye.** *Klin. Monatsbl. f. Augenheilkunde*, xlviii., ii., 5–6, No. 593.

198. COHN. **Ehrlich-Hata's "606" and the eye.** *Wochenschr. f. Ther. u. Hyg. d. Auges*, 1910, No. 1.

199. HIRSCH. **"606" in syphilitic eye diseases.** *Muench. med. Wochenschr.*, 1910, p. 1582.

200. NACHT. **Ehrlich-Hata in syphilitic diseases of the eye.** *Wochenschr. f. Ther. u. Hyg. d. Auges*, 1910, No. 9.

201. SCHANZ. **Ehrlich's "606" in eye diseases.** *Muenchener med. Wochensch.*, 1910, p. 2344.

202. IGERSHEIMER, J. **Experimental and clinical researches with salvarsan, with special reference to its action on the eye.** *Ibid.*, No. 51.

203. KOWALEWSKI, R. **Optic neuritis after "606."** *Berliner klin. Wochenschr.*, 1910, No. 47.

204. v. GROSZ, E. **Arsenobenzol ("606") in syphilitic eye diseases.** *Deutsche med. Wochenschrift*, 1910, Nos. 37 and 50.

205. WECHSELMANN and SEELIGSOHN. **The action of dioxydiamidoarsenobenzol upon the eye.** *Ibid.*, 1910, No. 47.

206. RANDOLPH, R. L. **The question of enucleation in purulent pan-ophthalmitis with a brief experimental study of the subject.** *Jour. Amer. Med. Assoc.*, June 18, 1910.

207. SAENGER, A. **Demonstration of a hemianopic prism phenomenon of Wilbrand.** *Ophthalmic Record*, Aug., 1910.

208. MCILROY, J. H. **The results of a short series of subconjunctival injections in the rabbit.** *Ophthalmoscope*, Sept., 1910.

HESS (183, **Tuberculosis of the eye**) claims that tuberculous diseases of the uveal tract are very common. A tuberculous iritis may be without the characteristic nodules, and some cases of serous iritis are tuberculous. The course may be very mild, or very grave, lasting for years. Tuberculosis plays an important etiologic part also in chorioiditis; it is present much more rarely in diseases of the retina and optic nerve. Keratitis parenchymatosa is due not rarely to tuberculosis, as is a portion of the cases of scleritis. Conjunctivitis phlyctenulosa is closely related to the same disease. Other conjunctival diseases may arise from external infection.

HAYASCHI (184, **Experimental researches concerning the aptitude of the eye to infection in diabetes**) shows that a certain slight content of sugar, such as is usually present in the tissues in diabetes, favors the settlement and growth of pus cocci and increases their virulence. Infection by pus agents after an operation on the eye takes place more readily in a diabetic than in a healthy person. A too rigorous antidiabetic diet, for the purpose of completely doing away with the sugar shortly before operation, is to be deprecated, because

the general condition and strength of the patient are occasionally impaired in this manner and the chances of the success of the operation reduced. Because of this increased predisposition to infection on the part of diabetics, the most stringent asepsis must be observed in operations on their eyes, particularly for cataract.

WEEKS (185, **The status of vaccine therapy in ophthalmology**) favors beginning treatment with tuberculin, either the new tuberculin, the bacillus emulsion, or the bouillon filtrate, in $\frac{1}{800}mg$ doses, and increasing by the same amount each treatment. He has already reported fifty cases from the practices of various ophthalmologists. Of these, thirty-five were virtually cured and fifteen greatly improved. Regarding gonococcic vaccine it is now recognized that it is of little value in acute infections, but he believes it will prove useful in treatment of manifestations of chronic gonorrhœa. Little success seems to have followed the use of Coley's vaccine in sarcoma of the eye. The gonococcic serum of Rogers and Torey has had scant trial in eye affections, but seems of value in chronic gonorrhœal joints. With streptococcic serum, results in less than a dozen reported cases are very variable. Little is known of tetanus serum, typhoid and meningitis anti-toxines, Deutschmann's serum, and cystogenic serum. It is quite evident that the whole subject is still in its infancy.

ALLING.

DERBY (186, **Vaccine and serum therapy in ocular therapeutics**) believes that tuberculin is a valuable addition to our treatment of tuberculosis. It is probable that good results may be obtained from any of the standard solutions, but the old tuberculin or those of Denys or Beranack are safer and more uniform in dosage and less likely to produce reaction than the emulsions or vaccines. All solutions should be fresh. He discourages the use of large doses, using those which will produce the slightest reaction, local or general. He reports thirty cases of ocular tuberculosis and on the whole the results are favorable.

ALLING.

The work of FILATOW (187, **The influence of blood sera upon the eye**) is a review of nine series of injections of the

normal sera of rabbits, guinea-pigs, dogs, and hens into the eyes of dogs. The injections into the anterior chamber were well borne in almost all cases, and excited little or no reaction. The injections into the vitreous produced no reaction in one series of cases, but in another they gave rise to irido-cyclitis. In some cases lenticular opacities followed, but these were ascribed not to the serum, but to mechanical injuries. A number of other injections of immune hæmolytic serum were made into the eyes of dogs and of rabbits, from which the following conclusions were drawn: The effect of hæmolytic serum upon the eye through the circulation is zero. The local effect is shown by inflammatory symptoms, slightly marked when the injections were into the anterior chamber; severe, in the form of irido-chorioiditis, when the injections were into the vitreous. The experiments concerning the influence of hæmolysine upon the resorption of hemorrhages into the eye (injections into the carotid artery, into the anterior chamber, and into the vitreous, either together with, or subsequent to, an injection of blood) gave no positive result. The conclusions of the author are: (1) Injections of normal rabbit serum, or of normal guinea-pig serum, into the anterior chamber and vitreous of rabbits are borne almost without reaction. (2) Normal dog serum, injected into the anterior chamber of rabbits, causes a mild inflammation in the anterior segment of the globe; injected into the vitreous, causes grave inflammation, usually irido-cyclitis. (3) Wolf serum injected into the vitreous of rabbits causes grave changes of inflammatory and degenerative character and formation of cataract. (4) Turtle serum in the vitreous of rabbits sets up a chronic inflammation, chiefly irido-cyclitis, with exudate, degenerative changes, cataract, and detachment of the retina. (5) Dog serum and rabbit serum, injected into the anterior chamber and vitreous of dogs, are borne almost indifferently. (6) Cat serum in the vitreous of dogs occasions a mild irido-cyclitis. (7) Hen serum in the vitreous of dogs causes inflammation of the inner membranes of the eye. The experiments with immune hæmolytic serum gave the following results: (1) Immune hæmolytic guinea-pig serum, with amboceptor, immunized with rabbit blood corpuscles, injected into the anterior chamber of rabbits, causes a mild inflammation of

the anterior segment of the globe; injected into the vitreous, causes a wearisome inflammation of the chorioid and retina, with degenerative changes of the epithelium of the ciliary processes, the lens, and retina (ablatio). (2) Immune hæmolytic serum, with amboceptor, injected into the anterior chamber of a rabbit, produces a mild inflammation of the anterior segment of the globe; in the vitreous, a chronic inflammation of the inner membranes with degenerative changes. (3) Immune hæmolytic cat serum likewise causes inflammation of the inner membranes of the eye when injected into the vitreous of rabbits. (4) Immune hæmolytic rabbit serum, with amboceptor, immunized with dog blood corpuscles, injected into the anterior chamber of a dog, causes a fairly severe inflammation of the tissue of the anterior portion of the eye; injected into the vitreous, causes a very severe inflammation of the entire eye (irido-chorioiditis). (5) Injections of immune hæmolytic serum into the circulation produced no changes in the eye, even in grave general intoxication. (6) Immune hæmolytic serum, freed of amboceptor and complement, causes no signs of inflammation when injected into the anterior chamber, and only slight ones when injected into the vitreous. (7) No signs of hæmolysis of the blood corpuscles in an intraocular accumulation of blood were perceived after injections of hæmolytic rabbit serum into the carotid artery of a dog.

HIRSCHMANN.

FILATOW (188, **The bacillus subtilis as a pathogenic agent**) instituted a series of experiments to ascertain the pathogenic importance of the two kinds of bacillus subtilis. He concludes that the second variety, taken from man, is pathogenic for the rabbit's eye. Introduced into the anterior chamber it produces a slight iritis, in the vitreous it produces a grave purulent inflammation of the inner membranes. The disease develops soon after the inoculation, without a period of incubation, and leads to destruction of the eye. The spores of bacillus subtilis themselves possess pathogenic properties. The intensity of the disease corresponds to the quantity and place of the injection. Injected into the veins of the ear, the bacillus subtilis produces an endogenous infection of the eye,

but only, it seems, in cases in which the eye is a place of less resistance because of a previous traumatism. In both dogs and cats injection into the eye produces a tempestuous panophthalmitis. The author comes to the conclusion that the different kinds of bacillus subtilis vary in their pathogenic power.

HIRSCHMANN.

After the administration of uranin there appears in the healthy eye, according to BURK (189, **The clinical, physiological, and pathological signification of fluorescence of the eye after the administration of uranin**), only a quite transient green discoloration of the iris and pupil at the end of eight hours, but in all intraocular inflammations there is a more or less marked staining of the altered vascular areas, proportioned to the degree of pathogenicity of the inflammation. Frequently the fluorescence calls attention to minimal inflammations; in quite rare cases it fails to do so. This shows the often high-grade change of the normal conditions of circulation, and proves that the metabolism in an inflamed eye takes place much more rapidly than in a healthy one. The reason that usually the pupil first appears green is that the anterior chamber is deepest at that point and furnishes a dark background which is most favorable for the perception of the fluorescence. The fact that the stain appears in the anterior chamber in the uranin test in iritis proves that the iris takes part in the production of aqueous in many pathological cases.

REBER (190, **The ocular palsies associated with induction of spinal anæsthesia with various solutions, with a report of five cases**) calls attention to the dangers incident to the use of spinal anæsthesia. He relates five cases of ocular paralyses which occurred in 2000 lumbar anæsthesias, making the total number of 36 recorded. In nearly all cases stovaine was used. Thirty-two showed involvement of the external recti alone. Two incomplete ophthalmoplegia externa and one fourth nerve-palsy. The average time of onset is ten days after the induction of the anæsthesia. The majority recover from the paralysis, but it would seem that a certain proportion (not yet fixed) may be counted upon to retain permanently some form of ocular paralysis as the result of the procedure. Whether the effect is caused by impurity of the drug employed,

by actual anatomical lesions such as hemorrhages at the nuclei of the nerves involved, or by some low-grade toxæmia remains yet to be determined. ALLING.

Although phlyctenular disease is not to be ascribed to a single etiology, yet IGERSHEIMER (191, **The relations between scrofulosis and the phlyctenular diseases of the eye**) has determined that the child suffering from this disease is either tuberculous, or is in a fair way to become tuberculous. The existing process in the eye can usually be momentarily cured by the ordinary local treatment, but the fundamental trouble is not corrected. The existing, or oncoming, tuberculosis should be fought as hard as possible. When the tuberculin reaction is negative, the child should be treated according to the principles of modern pædiatrics and should be prevented from coming into close contact with consumptives. If the child is already tuberculous, climatic treatment with tuberculin is best.

BAXTER (192, **A case of loss of vision following a small dose of santonin**) reports the following case. A girl, aged 5 years, suffering from thread worms and round worms, was given a dose of santonin in castor oil, which she immediately vomited. Three days later she again was given half a grain in castor oil, resulting in an evacuation in eight hours. For two days she was as if dying, and on the third was quite blind; three months later she had not recovered.

DAWNAY.

The experiment of PICHLER (193, **Ammonia burn of the eye and the neighboring skin**) shows that after a severe burn of the eye with ammonia a thorough irrigation of the conjunctival sac with water cannot inhibit the destructive influence of the poison, because such an irrigation removes only the superabundant poison from the conjunctival sac and probably from the most superficial layers of tissue, while the destructive influence is to be ascribed pre-eminently to the poison that has entered the eye. The removal of the poison can be attained only by paracentesis of the anterior chamber.

MOTOLESE (194, **Picric acid in ocular therapeutics**) comes to

the following conclusions from his experimental and clinical studies: I. As regards the physico-chemical properties: (1) Picric acid has a marked astringent power, greater than zinc sulphate, alum, and neutral lead acetate; less than basic lead acetate, tannin, and silver nitrate. (2) As it belongs to the group of electrolytes it possesses a great power of diffusion. (3) The aqueous solution of picric acid has a stronger bactericide effect than a solution in glycerine and water, and in addition it is more diffusible and less irritating. It is therefore preferable. II. As regards its physiological properties: (4) Picric acid has a considerable antiseptic power. (5) It possesses to a marked degree the property of promptly inducing repair of losses of the corneal substance. III. As regards therapy: (6) It gives good results in blepharitis. (7) Preparations of silver, especially protargol, act better in blennorrhagic conjunctivitis, but picric acid is indicated when corneal complications are present. (8) It is of no value on granular conjunctivitis. (9) In pseudo-membranous conjunctivitis, picric acid is of the highest efficiency and it may be considered a true specific in this disease. (10) Picric acid is of use in the catarrhal, asthenic ulcers of the cornea and in the cicatricial stage of keratohypopyon in burns and injuries of the eye.

CALDERARO.

MARZORATI (195, **The use of picric acid in ophthalmology**) uses picric acid in various affections of the eye. It diminishes the pain, promotes healing, and prevents infection.

DANIS.

HENDERSON (196, **Blindness due to the administration of synthetic arsenical compounds**) is inclined to attribute the optic atrophy and blindness in his patient, who was tabetic, to six injections of an unknown amount of soamin. He reviews the reports on the toxic effects of other arsenical preparations, as atoxyl, arsacetin, and orsudan.

ALLING.

HESSE, COHN, HIRSCH, NACHT, SCHANZ, IGERSHEIMER, KOWALEWSKI, v. GROSZ, and WECHSELMANN and SEELIGSOHN (197, 198, 199, 200, 201, 202, 203, 204, 205, **Salvarsan in diseases of the eye**) present the following reports on the

effects produced by salvarsan on diseases of the eye. Hesse treated seven cases of syphilitic irido-cyclitis, three of keratitis parenchymatosa, three of syphilitic chorioiditis, and one of irido-scleritis. All the cases of irido-cyclitis and keratitis parenchymatosa were benefited, while the cases of chorioiditis were not really influenced. In one case of syphilitic irido-cyclitis, which recovered at the end of nine days with normal vision, a grave neuro-retinitis appeared some time later in both eyes. He concludes that though this new remedy may quickly improve irido-cyclitis, yet if it is often followed by neuro-retinitis it must be used with care. Cohn reports a case in which "606" was injected because of a cutaneous eruption. Two months later the patient had a serious attack of iritis. Hirsch successfully treated three cases of syphilitic disease of the optic nerve that simulated atrophy. The walls of all the retinal vessels were much diseased and there was a reflex rigidity of the pupils. Nacht found the remedy inefficient in ten out of thirteen cases of syphilitic eye disease. Igersheimer claims that salvarsan as now used not only gives rise to no eye disease, but in many cases cures the syphilitic affections already present. According to Schanz and others, the diseased optic nerve is apparently unharmed by the remedy. Kowalewski reports a bilateral optic neuritis that appeared in a woman, 28 years old, two months after she had been injected, with a good result. The neuritis recovered under treatment with inunctions. According to v. Grosz, arsenobenzol is to be recommended in all syphilitic eye diseases and is harmless to the optic nerve. There is no fear of making an existing eye disease worse by the remedy. An improvement of a simple atrophy of the optic nerve is not to be expected, but this disease is not a contra-indication to the use of the remedy. A curative effect is to be expected in cases of syphilitic iritis, chorio-retinitis, and direct muscular paralyses. Keratitis parenchymatosa may also be favorably influenced. Wechselmann and Seeligsohn treated 250 cases with dioxydiamidoarsenobenzol after they had been examined ophthalmologically. In none was a change in the condition of the eye produced.

RANDOLPH (206, **The question of enucleation in purulent**

panophthalmitis, with a brief experimental study of the subject) induced acute purulent panophthalmitis in forty-three rabbits and guinea-pigs, to determine if meningitis occurs in this way. Infection was introduced by injections into the vitreous, by introducing infected foreign bodies, and otherwise duplicating the conditions which exist in man. The experiments were negative in every case. Coverslips from the meninges and sections of the brain showed no evidence of infection. In spite of these findings he is still unwilling to advise enucleation during the active stages.

ALLING.

SAENGER (207, **Demonstration of a hemianopic prism phenomenon of Wilbrand**) calls attention to an interesting and useful test in localizing lesions producing hemianopsia. If two prisms are suddenly placed before the eyes of the patient with the apices toward the blind half of the field, the eyes will be turned toward the apices of the prisms in order to bring the fixing object on the macula, provided the lesion is back of the primary optic ganglion. On the other hand, the eyes will not be turned if the lesion is in the ganglion of the optic tract, proving that a reflex exists independent of the cerebrum.

ALLING.

MCILROY (208, **Subconjunctival injection in the rabbit**). The rabbits were anæsthetized with ether and ten minims of sodium-dionin-bicyanide solution injected. Twenty hours later animal killed. Fixation of operated and central eye in formol saline solution. Paraffine sections. Straining by Weigert's rapid iron hæmatoxylin method. In other cases normal saline was injected.

The injections were followed by little reaction clinical or histological. Dilatation of the vessels of the iris was noteworthy. The chorioid is unaffected. The sclerotic is usually free from infiltration. A distinct increase of albumin is found in the aqueous. T. HARRISON BUTLER.

III.—REMEDIES AND INSTRUMENTS.

209. BLAKE, E. M. **Long-continued use of strychnine in toxic amblyopia.** *Ophthalmic Record*, Nov., 1910.

210. BUTLER, T. HARRISON. **On tuberculo-toxæmia of the eye and**

on the therapeutic and diagnostic value of injections of tuberculin in its treatment and diagnosis.

211. PERCIVAL, A. S. **Bifocal lenses.** *Ophthalmoscope*, Feb., 1910.

212. GOLOWIN, S. S. **The method of retrobulbar transillumination in operations.** *Westn. Ophthalm.*, 1910, No. 11.

213. SMITH, P. **A new simple ophthalmoscope.** *Ophthalmic Review* Feb., 1910.

214. CRIDLAND, B. **The tonometer of Schioetz.** *Ophthalmoscope*, Sept., 1910.

215. MARPLE, W. B. **Some observations on the Schioetz tonometer.** *Trans. Amer. Ophthalm. Soc.*, 1910.

216. BUYS, E., and COPPEZ, H. **Graphic records of nystagmus.** *Ophthalmoscope*, Dec., 1909.

BLAKE (209, **Long-continued use of strychnine in toxic amblyopia**) treated a patient who showed characteristic signs of poisoning with tobacco and alcohol and whose vision was only fingers at ten feet. Strychnine injections were given twice a week, and to the amount of $\frac{1}{30}gr$ daily by mouth. This treatment was continued practically continuously for two years, when the vision had reached $\frac{10}{15}$. The color perception was greatly improved but the temporal atrophy was unchanged. ALLING.

BUTLER (210, **On tuberculo-toxæmia of the eye and on the therapeutic and diagnostic value of injections of tuberculin in its treatment and diagnosis**) records in this paper his clinical experience with tuberculin. The author, after pointing out that tuberculous foci in the body generate toxines which may cause characteristic inflammations in the eye, gives a record of some twenty cases in which old tuberculin had been used as a diagnostic agent and new tuberculin for treatment. He is rather inclined to think that the therapeutic action of a dose of old tuberculin which has caused a reaction, is superior to that obtained by T. R. used in small doses. The best results were obtained in low-grade cyclitis with vitreous haze. One case which upon clinical grounds was held to be syphilitic interstititial keratitis with disseminated chorioiditis did not improve upon mercury, but a local and general reaction showed that the true etiology was tuberculosis, and treatment with tuberculin was followed by rapid improvement. In another case a woman was led to the hospital blind from vitreous opacity. After reacting to old tuberculin, such a rapid

clearing up of the vitreous followed that in fourteen days $V = \frac{5}{5}$ and finally $\frac{5}{10}$. The author claims no originality for his paper. T. HARRISON BUTLER.

PERCIVAL (211, **Bifocal lenses**). The smaller the reading segment the better. A square segment 9*mm* × 12.5 *mm* should not be exceeded. The segment should be 2.5*mm* to the nasal side of the mid-vertical line, and 6.5*mm* to 7*mm* below the mid-horizontal line. A narrow strip, 2.5*mm* wide, should be left below the reading segment to enable the wearer to see step, etc. A formula is given to find the correct optical centre of the wafer. T. HARRISON BUTLER.

GOLOWIN (212, **The method of retrobulbar transillumination in operations**), when in doubt whether a neoplasm is really present in the posterior segment of the globe, or one is simulated, employs a little lamp constructed for him which he introduces through an incision in the conjunctiva between two recti in the desired situation, *e.g.* between the externus and the superior rectus, to the necessary place. This produces sufficient transillumination and renders the diagnosis positive. If a neoplasm is present, enucleation should be performed immediately. The author employed this transillumination in a doubtful case, that he reports, and so was able to avoid enucleation. HIRSCHMANN.

SMITH (213, **A new simple ophthalmoscope**). The ophthalmoscope possesses a concave and a flat mirror, and so may be used as a retinoscope or an indirect ophthalmoscope. By placing lenses in a clip it may at a pinch suffice in a rough way for the direct method. Professor Priestley Smith has succeeded in combining the advantages of the mirror with a hole and one without a hole in which the silvering alone is wanting at the centre. The first variety has a tunnel which casts unpleasant reflexes; the second is difficult to clean. The back of each mirror is protected by cementing upon it with Canada balsam a disk of glass of the same diameter as the mirror itself. The concave mirror is formed by placing a bi-convex lens in front of a plane mirror. The instrument, which is framed in celluloid, is made by R. Bailey of Bennett's Hill,

Birmingham. The ophthalmoscope is being extensively used.

T. HARRISON BUTLER.

CRIDLAND (214, **The tonometer of Schioetz**) describes this tonometer. The article is well illustrated. This instrument is undoubtedly the best of its kind. The chief objection to it is its price, which is now high and steadily rising.

T. HARRISON BUTLER.

MARPLE (215, **Some observations on the Schioetz tonometer**) is favorably impressed with the practicability of this instrument. He has repeatedly checked his observations by having others make independent measurements and has invariably found little variation. He finds the tension of normal eyes to vary from 13 to 24*mm* of mercury with average 19.5. In glaucoma the tension varies from 35 to 134, the latter being a case of absolute glaucoma. He finds that cocain, pilocarpin, atropin, and eserin have no effect on the tension of the normal eye. ALLING.

BUYS and COPPEZ (216, **Graphic records of nystagmus**). This paper is illustrated by a reproduction of the smoked drawn figures obtained from the nystagmograph. Wajatscheh first employed an instrument which he called a photo-nystagmograph. This was a small mirror applied over the closed eye, reflecting the image of an illuminated slit on to sensitized paper. Buys has devised a more simple apparatus, consisting of a cupule closed by goldbeater's skin. This is applied to the eye and mounted on a mobile arm. The cupule is connected by caoutchouc tubes to a writing machine. With this apparatus the authors have investigated vestibular nystagmus, miner's nystagmus, and congenital nystagmus.

There are two chief varieties. In one the movements going and coming are identical. This is undulatory nystagmus, better described as pendulatory. In the second variety the two movements have different speeds. This may be termed *nystagmus à ressort*. Each of these varieties can be circular, vertical, horizontal, or oblique. The authors find that pendulatory nystagmus is essentially an optical phenomenon. It is seen in congenital nystagmus, albinism,

nystagmus due to leucomata and other opacities of the media. Miner's nystagmus also takes this form. In Freidrich's hereditary ataxy ***nystagmus à ressort*** is an essential symptom. It is noted in insular sclerosis, and in all processes which tend to limit the cerebral capacity. But much work remains to be done with the nystagmograph before the exact ætiology of the chief varieties can be ascertained with any degree of exactitude. T. HARRISON BUTLER.

Sections IV.–VII. Reviewed by DR. ABELSDORFF, Berlin.

IV.—ANATOMY.

217. SCHOCK, K. **The terminal ramification of the sympathetic nerve in the iris.** *Arch. f. vergl. Ophthalm.*, i., 3, p. 293

218. DE LIETO VOLLARO. **Morphology of the human dilatator pupillæ.** *Archivio di ophtalmologia*, 1909, 2–3.

219. GUGLIANETTI. **The plasma cells in acute inflammation of the eyeball.** *Ibid.*, fasc. 2, p. 40.

220. THOMSON, A. **The gross anatomy of the filtration angle of the human eye.** *Ophthalmoscope*, Sept., 1910.

221. BUTLER, T. H. **Three cases of enophthalmos.** *Ophthalmoscope*, May, 1910.

222. SAUTTER, A. C. **Traumatic enophthalmos.** *Annals of Ophthalmology*, Oct., 1910.

223. COOVER, D. H. **Cryptophthalmia. With report of two cases.** *Jour. Amer. Med. Assoc.*, July 30, 1910.

224. CONTS, S. **A case of microphthalmos, with remarks.** *Ophthalmoscope*, Oct., 1910.

SCHOCK (217, **The terminal ramification of the sympathetic nerve in the iris**) concludes from his examinations of various mammals: (1) In the iris are uni-, bi- and multi-polar ganglion cells which represent the terminal filaments of the sympathetic nerve. (2) The processes from the ganglion cells form a network which is in immediate connection with the stroma cells. (3) The endings of the nerve in the stroma cells appear in different forms: (*a*) in the body of the stroma cell; (*b*) as a terminal organ sessile to the cell, analogous to Ranvier's *tache motrice;* (*c*) as a ganglion cell so closely attached to the stroma cell that the nature of its attachment cannot be determined.

DE LIETO VOLLARO (218, **Morphology of the human dilatator pupillæ**). The membrane known as the posterior limiting membrane of the iris, or Bruch-Henle's membrane, is a continuous

myoid plate consisting of elements which are very similar to the myo-epithelial cells of the actinia. These elements are arranged so as to form two layers, an anterior, consisting of the protoplasmic and contractile portion, and a posterior or nuclear layer. The transformation of the anterior pigment epithelium of the iris brings about the myoid membrane. The cases are rare in which an apparent dissociation of this plate from the little bundles can be made out, or a true muscular increase of the bundles (Formark) are met with. The myoid membrana dilatatrix pupillæ arises with arched bundles from the angle formed by the pigment covering of the posterior surface of the iris and the epithelial covering of the anterior ciliary processes. Stretched as a continuous layer between the iris stroma and the posterior pigment epithelium, it divides at the level of the periphery of the region of the sphincter into broad finger-shaped expansions which, blending with the muscular bundles of the sphincter, reach almost to the margin of the pupil. CALDERARO.

GUGLIANETTI (219, **The plasma cells in acute inflammation of the eyeball**). (1) Sympathetic inflammation: examination of three cases. Uvea in general greatly infiltrated. Chorioid especially infiltrated in its outermost layers; ciliary processes markedly infiltrated in contrast to the ciliary muscle. Iris infiltrated in two cases, especially in the posterior layers. The infiltration is formed of large quantities of leucocytes and plasma cells. The leucocytes are arranged in compact groups, frequently about the vessels. The plasma cells also accumulate about the vessels, although they are diffusely infiltrated throughout the stroma of the uvea. They are more numerous in the ciliary processes than in the other parts of the chorioidea, which is chiefly infiltrated with leucocytes. The infiltration of the retina, optic nerve, and sclera is slight. A few degenerated plasma cells are met with, together with others that are well preserved. In injuries of the cornea, plasma cells are extremely abundant during the period of cicatrization and decrease in number afterward. (2) Recurrent syphilitic iritis with commencing atrophy of the eyeball. Considerable thickenings of plasma cells are met with about the vessels in the limbus. The atrophic iris stroma exhibits

a considerable infiltration with the same elements. Ciliary body, chorioid, retina, and optic nerve contain extremely few plasma cells. In the sclera, groups of well preserved plasma cells are found in some little branches of the anterior ciliary vessels. (3) Miliary tuberculosis of the iris and of the ciliary body. The iris stroma corresponding to the tubercle nodules is markedly infiltrated with plasma cells. To a less degree the ciliary body is also infiltrated with these elements, while the other parts of the eyeball are comparatively free from them.

CALDERARO.

THOMSON (220, **The gross anatomy of the filtration angle of the human eye**), the Professor of Human Anatomy at the University of Oxford, read a most valuable paper, illustrated by projections of sections of the frozen eye, to the Oxford Ophthalmological Congress in July, 1910. Most of the conceptions of the relations at the filtration angle have been derived from the study of microscopic sections of eyes hardened in Müller's fluid. Thomson Henderson has shown that this agent produces a tilting of the ciliary body with consecutive distortion of the relationships. Professor Thomson, who made sections of the eye frozen as soon as possible after enucleation, has arrived at a similar result. The anatomy described by Leber and others and supported by Priestley Smith is in many respects incorrect. Both Thomson and Thomson Henderson fix in formol which does not distort the ciliary body. Studied in this way, Thomson finds that there is a swelling at the corneal periphery, just centripetal to the iridic angle, which causes a well marked groove all round the posterior peripheral portion of the cornea. This is well shown in the splendid photographs which illustrate the paper. The Professor concludes:

(1) That there is strong evidence that this groove exists in the normal eye and is not an artifact.

(2) That when the pupil is dilated the groove forms a recess which receives the thickened iris.

(3) That when the iris is contracted the traction exerted by the iris obliterates the groove.

(4) That the movements of the iris may assist the circulation of aqueous at the iridic angle.

T. HARRISON BUTLER.

BUTLER (221, **Three cases of enophthalmos**). Two of the cases were of congenital origin associated with paralysis of certain ocular movements. The author suggests that the recti concerned were congenitally absent or developed in a rudimentary manner. This absence would create more space in the orbit, and so determine the enophthalmos.

T. HARRISON BUTLER.

SAUTTER'S (22, **Traumatic enophthalmos**) patient was struck on the fronto-temporal region by a baseball. The immediate results were only those of severe contusion—paralytic mydriasis, commotio retinæ, and subconjunctival hemorrhage. Some weeks later recession of the eyeball was noticed, amounting to 5 or 6*mm*. The X-ray showed that fractures had occurred involving the right zygomatic process, the external and superior orbital margin, and probably the floor of the orbit as well as the nasal orbital wall. The condition is attributed to rupture of the cheek ligaments and the development of cicatricial tissue within the orbit.

ALLING.

COOVER (223, **Cryptophthalmia, with report of two cases**) describes two cases of congenital ankylo-blepharon and symblepharon. In these cases there is also always abnormality of the eyeball and generally other bodily defects. There is generally some indication of the palpebral fissure and occasionally, as in his case, some of the eyelashes are present. Both cases were bilateral. Nine are on record.

ALLING.

CONTS (224, **A case of microphthalmos, with remarks**) describes in a long and valuable paper the careful histological examination of a microphthalmic eye made by the author, at that time pathologist at "Moorfields." It is copiously illustrated by excellent microphotographs and diagrams. The conditions found were:

(1) An anterior synechia of the pupillary membrane and iris. This is a pure abnormality, and not the result of a perforation.

(2) A membrane on the surface of the iris continuous

with the pupillary membrane. This may give rise to a rare abnormality—fibrous membrane on the iris.

(3) An iris which imperfectly developed.

(4) Persistence of the fibro-muscular sheath of the lens. These two observations have a bearing on the subjects of aniridia and coloboma iridis.

(5) Backward displacement of the ciliary processes relative to the ciliary body.

(6) Persistence of a mesoblastic strand in the vitreous.

(7) A coloboma of the ciliary body and iris.

(8) Dislocation of the lens backwards and outwards.

(9) Cystic dilatation of the posterior chamber.

(10) Replacement of the unpigmented epithelium of the ciliary body by pigmented epithelium and by embryonic retina.

T. HARRISON BUTLER.

V.—PHYSIOLOGY.

225. SHUTE, D. F. **Torsion of the eyeball.** *N. Y. Med. Jour.*, July 16, 1910.

226. DOYNE, R. W. **Visual sensation, perception, appreciation, and judgment.** *Ophthalmoscope*, July, 1910.

227. PARSONS, J. HERBERT. **Glare, its causes and effects.** *Lancet*, 1910, i., p. 234.

228. EDRIDGE-GREEN, F. W. **The relation of light perception to color perception.** *Ophthalmoscope*, Oct., 1910.

229. STILLING, J. **Origin and nature of the anomalies of the color sense.** *Zeitschr. f. Sinnesphysiol.*, xliv., 6, p. 371.

230. JULER, F. A. **Congenital color blindness with day blindness.** *Ophthalmic Review*, March, 1910.

231. EDRIDGE-GREEN. **The relation of photography to vision.** *Ophthalmoscope*, Jan., 1910.

232. BIRCH-HIRSCHFELD and INOUYE, N. **Further experiments concerning the effect of the ultraviolet light upon the retina.** *Arch. f. d. ges. Physiolog.*, 136, p. 595.

233. BRUECKNER, A. **The visibility of the blind spot.** *Ibid.*, p. 610.

234. BEHR, C. **The reflex character of the processes of adaptation, especially to dark, and their relations to topical diagnosis and to hemeralopia.** *Arch. f. Ophthalmol.*, lxxv., ii., p. 201.

235. CALDERARO. **Experimental researches concerning the excitability of the optic nerve in man.** *La Clinica Oculistica*, June, 1909.

SHUTE (225, **Torsion of the eyeball**) points out a common error in describing the movements of the eye as taking place about three fixed axes, a vertical, a horizontal, and an anterior-

posterior axis all passing through the centre of rotation of the eyeball—whereas the position of the centre of the cornea after any version can be brought about by rotation about a vertical and a horizontal axis in Listing's plane. Listing's plane is a transverse plane passing vertically through the centre of rotation. The so-called wheel rotation is a virtual torsion only and should properly be viewed by assuming a point of observation in the line of fixation of the eye examined when it is in the secondary position, and not from a position directly in front of the eye when in the primary position, as is usually done. ALLING.

DOYNE'S (226, **Visual sensation, perception, appreciation, and judgment**) lecture was delivered at Oxford in May, 1910, as a part of the course of Ophthalmology for those reading for the new Diploma of Ophthalmology. It is impossible in a short abstract to do justice to this illuminating and suggestive paper which no one should miss reading in its original form. An interesting case is cited of a man who had apparently lost his form sense, his light sense being at the same time exaggerated. He would count the number of men at a dinner table by the glare from their white shirt fronts, although he could not see them at all. A color centre is hinted at and a case described of a signalman who became color blind after tetanus which had been successfully treated with serum. The remarks upon word dumbness are original and deeply interesting. A contrast is drawn between the "schoolmaster's boy" who learns easily and knows all his dates, and the really clever boy who may spell badly and can never remember dates and figures. In an exaggerated case a theological student who tried to read lessons would grasp the meaning of a word but not the word itself and so might say "great" for "mighty" or "God" for "Lord."

T. HARRISON BUTLER.

PARSONS (227, **Glare, its causes and effects**) says that the condition of adaptation of the retina is one of the most important factors in the production of glare, as may be seen by the effect of bright light in dark adaptation, although the variations in illumination are not necessarily very rapid or extreme. Sharp definition depends largely on contrast between the retinal

image and the surrounding area of retina, for by the process of spatial induction (Hering) the sensitiveness of the surrounding retina is relatively depressed; but if the retina be flooded with diffused light this action will be depressed and the sharpness of definition of the image blurred. No retinal image is quite sharp owing to the optical defects in the eye, and spatial induction tends to counteract the irradiation so caused; anything therefore interfering with spatial induction must upset clear vision. The contraction of the pupil not only reduces spherical aberration and irradiation but also affords some protection against strong light; but sudden intense illumination, such as the bright flash of a short circuit, may give rise to serious changes in the retina, possibly due to chemical alteration in the visual purple and the structural elements causing destruction and loss of function. Is it only the intensity of the light or some form of energy in some of the incident rays, that causes glare? The chemically active ultraviolet rays are largely absorbed by the lens and may therefore be of only secondary importance. Color is not a cause but is beneficial in reducing glare. Parsons thinks that "as far as the physical side is concerned glare is a function of luminosity rather than of color; on the physiological side, retinal adaptation and spatial induction are the prepotent factors, the latter specifically invalidated by the direction of incidence of a superfluity of extraneous rays." The discomfort from glare if long continued may cause pain, from the summation of submaximal stimuli; the prolonged contraction of the muscles screwing up the eyes and puckering the brows becomes painful by squeezing the supraorbital nerve, the pain spreading to other branches of the fifth cranial nerve. The condition resembles that seen in conjunctival inflammations giving rise to photophobia, which should rather be called reflex blepharospasm, as it is due to irritation of the nerve endings of the fifth nerve in the cornea and conjunctiva; possibly light may stimulate other fifth-nerve endings in the ciliary body and chorioid behind the retina, especially at the macular region and in the iris, by strong contraction of the sphincter. This, however, is problematical and requires further investigation. The effects of glare fall into two groups: (1) discomfort and pain without further result,

and (2) those due to intense stimulus, scotoma, transient or in some cases permanent, to be accompanied later with changes in the retina, as pigmentation in the macula; such is particularly seen in cases resulting from observing solar eclipses with unprotected eyes. Prolonged exposure to bright light in the tropics and at sea is sometimes followed by night blindness, due to the effects of retinal exhaustion from bleaching of the visual purple with delayed restoration. Such changes might be produced by the ultraviolet rays, which are the cause of snow blindness, but this is a totally different condition.

PAYAN DAWNAY.

EDRIDGE-GREEN (228, **The relation of light perception to color perception**) describes his new spectrometer. This instrument enables the examiner to demonstrate and isolate any particular area in the spectrum and to read off its wave length in mille-microns by means of graduated drums. The individual can also be asked to isolate any special color demanded. This instrument is made by Adam Hilgar, Ltd., London. Each graduated drum moves a collimator and registers the wave length at each end of the piece of spectrum in view. Tested with this instrument, a normal individual will as a rule name six colors, red, orange, yellow, green, blue, violet, and will mark out about 18 monochromatic patches. Very rarely we may find an individual who can distinguish indigo, and he will mark out 22–29 monochromatic patches. The instrument is most useful in examining candidates for the railway or marine service, more particularly those who have been referred for re-examination after failure to pass the usual tests. By its means too a spectrum shortened at either end is at once detected. Color-blind individuals may fail because the perceptive power for certain colors is absent or because the spectrum is shortened. Thus a boy was found to have perfect hue perception but his spectrum for bright light was shortened to $\lambda 700$. He also had defective perception of red rays adjacent to the shortened portion. Such an individual may fail to see an obvious red light and cause an accident.

T. HARRISON BUTLER.

According to STILLING (229, **Origin and nature of the anomalies of the color sense**) there are four fundamental colors,

red, green, yellow, and blue. Examination of the color sense by means of simultaneous contrast has been neglected very much in modern times. From the absence of a contrast we can learn the absence, or weakness, of the color energy in question. The results are clearer and more indubitable in acquired than in congenital color blindness. He thinks that the only cause of this which we know, the atrophy of the optic nerve fibres, may exert physical influences in the color disturbances in retinitis albuminurica and especially in affections of the retinal nerve fibres. In affections of the optic nerve, blindness to a single color never appears, but always for at least a pair, red and green or yellow and blue. The disturbances of the sensitiveness to light are, within wide limits, independent of those of sensitiveness to color, and inversely this mutual independence compels the assumption of a different system of fibres for these two kinds of perception. It is further to be assumed that the fibres which take part in the perception of color are divided into two systems, one for red and green, one for yellow and blue. The terminal organs for sensitiveness to color cannot lie in the cones, because great reduction of the vision of the fovea centralis by injury of "the mosaic layer" leaves the sensitiveness for color intact; the terminal organs are rather to be sought in the external granular layer.

There is no real difference between congenital and acquired color blindness as regards the disturbance of the color perception, or the sensitiveness to light. As total congenital color blindness must be considered pathologic and may be ascribed to a fœtal inflammation of the optic nerve, so partial congenital color blindness may be due to an inhibition of the development of the nerve fibres, and thus color blindness in general may be regarded as a consequence of disease of the optic nerve. In the so-called anomalous trichromates there is not a deviating color system, but only a quantitative difference in the sensibility for colors, a color amblyopia, such as precedes acquired color blindness.

Helmholtz's theory contains the error that there may be more psychically simple kinds of ideas than there are nervous energies (theory of four fundamental colors and three colors). As we do not know what color may be, as a physiological pro-

cess all color theories seem to be more or less unimportant. But Hering has at least furnished knowledge of the psychophysic parallelism to the study of color and his theory is in harmony with the facts.

JULER'S (230, **Congenital color blindness with day blindness**) three patients were all siblings aged 8, 5½, and 3. The first two appeared to be totally color blind, but in the case of the third, aged 3, the color test was naturally unsatisfactory. The color blindness was associated with defective vision and photophobia. All had nystagmus. The photophobia was not marked. It is difficult to see why the author regards the patients as being "day blind," for he expressly says that the first could not see better under diminished illumination, and the subject is not mentioned in respect of the two younger patients. An attempt is made to explain the phenomena by the absence of retinal cones, but there is a tendency to regard theory as fact. As a matter of fact, our knowledge of the functions of the rods and cones and of the visual purple has not yet passed beyond the hypothetical stage. T. HARRISON BUTLER.

EDRIDGE-GREEN (231, **The relation of photography to vision**). The title of this paper merely expresses the fact that the paper was read to the Royal Photographic Society. In it the author stated his well-known views as to the function of the visual purple, the office of the rods and cones, and the nature of color blindness. The visual purple bathes the rods and cones, and is even present in the macula of an eye which has been kept in the dark. This is bleached by light; a change ensues comparable to that which takes place when a plate is exposed. This change in some way acts upon the rods and cones, and produces the sensation of vision. The second half of the paper will be common property to all who have read the author's well-known books on color vision. Color-blind persons are individuals in an arrested stage of embryonic development. The human being shared with animals a continuous gray spectrum. Then a tinge of red appeared at one end, a tinge of violet at the other. Then, perhaps in the Stone Age, the red and violet bands joined in the centre of the spectrum and we got a typical Daltonian, a bichromic indi-

vidual. Later, perhaps in the Bronze Age, green appeared, separating the red and violet. The other colors appeared in due course. All these stages of development are represented by the varieties of color-blind persons, who are "throw-backs" to a primitive ancestry. In other words, color blindness is an instance of atavism. The present stage of development is the hexachromic, the man with the average color vision seeing all the spectral colors except indigo. A few individuals are able to see indigo and they represent the final stage of color vision, a stage which, if Edridge-Green's theory be correct, should eventually be reached by the whole race.

T. HARRISON BUTLER.

BIRCH-HIRSCHFELD and INOUYE (232, **Further experiments concerning the effect of ultraviolet light upon the retina**) tested the action of ultraviolet light on the retina of the dove, after removing the cornea and lens. The chromatin of the ganglion cells and on the inner layers of the inner granular layer was completely bleached out. This loss of chromatin took place mainly in the inner layers of the retina. The changes that take place in the cones, rods, and pigment in the outer layers may not be distinctly marked and may be demonstrable after the action of relatively long-waved light in degrees of intensity which do not influence noticeably the chromatic structure of the ganglion cells. The inner layers of the retina absorb the ultraviolet rays and protect the outer layers from their effect, while they themselves are influenced and changed.

BRUECKNER'S (233, **The visibility of the blind spot**) investigations are devoted to the elucidation of two questions: (1) What do we see at the place of the blind spot? (2) Why do we perceive no aperture in the visual field even with monocular vision? His results are thus summarized: The blind spot may become visible as a disc when looking at a homogeneously colored surface. The color of this disc varies and is dependent on the quality of the surrounding field. The visibility of this disc is always very brief, especially when it appears to be of a variegated color. At the place of the blind spot after-images may be observed, parallel throughout to those which appear on places in the "seeing" retina. A

certain degree of dark adaptation is a very essential factor for the visibility of the blind spot. The possibility of perceiving the blind spot depends on contrast. Symptoms may become visible at the margin of the blind spot, which are to be explained as marginal contrast. The usual invisibility of the blind spot on a homogeneous surface depends on a process that is at least nearly related to the so-called local adaptation. Perhaps also a physiological irradiation of the stimulation takes part. This is rather probable in those cases in which the blind spot falls on the boundary between two immediately adjacent surfaces having different colors. Here the central (foveal) field has a decisive influence over the filling out of the field of the blind spot. The fact that under certain conditions both blind spots may be simultaneously visible disproves the assumption that the visibility of the blind spot in monocular vision through dark adaptation is caused by the closure of the other eye.

According to BEHR (234, **The reflex character of the processes of adaptation, especially to dark, and their relations to topical diagnosis and to hemeralopia**) the increase of sensitiveness to light of a normal eye on remaining in the dark is retarded and lessened by simultaneous continual irradiation of the other eye. The dark adaptation (rod function) may be disturbed to a high degree in optic atrophy in spite of normal vision and normal color fields, the same as in the unaffected portions of the visual field in diseases of the chiasm. This reduction of the dark adaptation is called forth especially by inflammation and inflammatory degenerative processes, while simple compression harms the dark adaptation less than the vision and the color sense (cones). In incomplete tract hemianopsias the function of the rods may be highly impaired in those parts of the field of the diseased halves in which the function of the cones has been partially restored. In incomplete relative hemianopsias of intracerebral origin, on the contrary, there is lacking any impairment of the dark adaptation in spite of the disturbance of the color sense. We are therefore able in many cases by the study of the dark adaptation to detect a disturbance of the basal optic tract which is not demonstrable by other methods of examination. On the other hand, in incomplete and relative homonymous hemianopsias, the

demonstration of a disturbance of the dark adaptation in the areas still relatively able to functionate of the relatively lost halves of the visual field indicates a lesion of the tract, or of the corpus genicul. laterale, rather than an intracerebral trouble, and the reverse. In the reported cases of tract hemianopsia the pupils and palpebral fissures on the same side as the hemianopsia were larger than in cases due to intracerebral trouble. As the author regards the dark adaptation as a function of the rods, especially of the visual purple, he draws from the reported clinical and physiological observations the conclusion that the function of the rods, or the regeneration of the visual purple, is controlled by a higher centre, presumably situated between the optic tract and the intracerebral paths of conduction.

CALDERARO (235, **Experimental researches concerning the excitability of the optic nerve in man**). It is commonly assumed that the excitation of the optic nerve by adequate stimuli (light waves), or by inadequate stimuli (compression, electricity, etc.), may call forth the sensation of light (Mueller's law). The solution of this problem seems impossible because of the difficulty of approaching the optic nerve and the necessity of experimenting on man. Calderaro was able to utilize some patients on whom he was obliged to perform a more or less complete exenteration of the orbit on account of malignant neoplasms. By removing the outer wall of the orbit and the neighboring portion of the malar bone, an opening was made through which the optic nerve could be reached, while its relations to the still seeing eyeball were maintained. He touched the optic nerve with a probe, pierced it with a needle, stimulated it with the galvanic and the faradic current, crushed it with forceps, cut it with scissors, but the patient had no perception of light. The same experiments tried on the end of the stump of the optic nerve gave equally negative results. He therefore assumes that the optic nerve fibres, both the centripetal and the centrifugal, are incapable of responding to mechanical stimuli along their course, and still less of guiding them to the centres of perception in order to excite the sensation of light. SPECIALE.

VI.—REFRACTION AND ACCOMMODATION.

236. LUNDSGAARD, K. **Transitory hypermetropia in diabetes mellitus.** *Klin. Monatsbl. f. Augenheilkunde*, xxxviii., ii., p. 39.

237. DUHAR. **Accommodative asthenopia, a unique symptom of the commencement of diphtheria.** *L'echo medicale*, xiv., p. 629.

238. DUFOUR. **School myopia. Origin and development.** *Report of the Third International Congress of School Hygiene*, 1910.

239. STEPHENSON, SYDNEY. **The aftermath of eyestrain.** *Lancet*, 1910, vol. ii., p. 1743.

240. KALOSCHNIKOW, W. P. **The causal connection between headaches and errors of refraction.** *Russk. Wratsch.*, 1910, Nos. 30 and 31.

241. KROENER. **Apparent accommodation.** *Inaug. Diss.*, Leiden, 1910.

242. THOMPSON, A. H. **The operative treatment of high myopia.** *Ophthalmic Review*, Nov., 1910.

LUNDSGAARD (236, **Transitory hypermetropia in diabetes mellitus**) reports two cases: In one a hypermetropia of 3 D appeared in a diabetic and as the sugar disappeared from the urine was replaced by emmetropia. In the second case there was a hypermetropia of 2.5 D, which later became emmetropia in the right eye, +0.5 D in the left. Punctate vacuoles could be seen in both lenses by means of the ophthalmoscopic mirror. The decrease of the hypermetropia was not dependent on the disappearance of the sugar. The change of refraction was dependent on neither a change of tension (Schioetz tonometer), nor on a change of the curvature of the cornea. The cause is therefore presumably to be sought in the lens.

DUHAR (237, **Accommodative asthenopia, a unique symptom of the commencement of diphtheria**) found a manifest hypermetropia of 2 D, a total of 4 D, with a slight rise of temperature, in a child 6 years old, who had 14 days previously had a febrile eruption resembling urticaria. There was only a slight sore throat, yet the secretion taken from it contained masses of diphtheria bacilli. The author thinks the accommodative asthenopia in this case to have been an initial symptom of diphtheria. CAUSÉ.

DUFOUR (238, **School myopia. Origin and development**) says that it is undisputed that near work is the chief factor in the increase of myopia and that other co-operative factors are convergence, accommodation, movements of the eye, and position of the head. The cause of the origin of myopia is not yet known. Primarily there is a hereditary predisposition to a long axis of the eyeball, consisting of a reduced power

of resistance on the part of the membranes of the eye. Growth is of influence, especially in weakly children. Finally the cause may be in the eye itself: in the presence of opacities of the refractive media, of astigmatism, or of congenital defects of the eye. CAUSÉ.

STEPHENSON (239, **The aftermath of eyestrain**) deals with the manifestations of eyestrain, the commonest of which he points out to be headache. Slight refractive errors are a frequent cause especially in the "neuropathic" type of patient among the better educated, and he lays stress on the necessity of the use of a cycloplegic for the correct detection and estimation. He further deals with other stated signs and effects of the condition, and gives an extensive list of references to printed articles on this subject. PAYAN DAWNAY.

KALOSCHNIKOW (240, **The causal connection between headaches and errors of refraction**) reports 28 cases in which obstinate headaches that did not yield to treatment were perfectly cured by wearing glasses that corrected the errors of refraction. The more serious cases were associated with various nervous symptoms, dizziness, fainting, vomiting, and other digestive disturbances. The errors of refraction were often of a very slight degree: astigmatism of .25 and .50 D, anisometropia, disturbances of the motility caused by refractive errors and accommodative strain, especially during the age of school life. He is inclined to think that in most cases of obstinate headache medical treatment should begin with an examination of the eyes. HIRSCHMANN.

KROENER (241, **Apparent accommodation**) was able to demonstrate in the minority of the examined aphakic eyes a slight apparent accommodation, usually about 1 D, rarely as great as 4 D. It is produced not by a change in the refraction but principally by the regular and irregular astigmatism and the spherical aberration of the eye and the glass. It is therefore not absent in eyes that contain lenses, but is usually present to a higher degree in aphakic eyes. Spherical aberration produces its greatest effect at a short distance from the eye, consequently the apparent accommodation for near is as a rule greater than for distance. The greater the devia-

tion from the regular refraction, the larger the dispersion images on the retina and the greater the apparent accommodation, because the relative difference of the dispersion images becomes less as the distance increases. R. P. VISSER.

THOMPSON (242, **The operative treatment of high myopia**) says that the average refraction of an aphakic myopic eye is half the previous myopia plus a figure which varies between 9 and 15 but is on an average 10.5. We may get emmetropia after needling a lens as low as −18 or as high as −26. On the whole it is justifiable to operate upon myopia above −18. The refraction of the author's patients before and after operation is given in a table. It is not advisable to operate after 30 years of age. The operation has no effect in preventing the progress of myopia, but the lengthening of the eye has about half the effect in the aphakic eye to what it has in the unoperated eye. A posterior staphyloma or chorioiditis should be a bar to any operation, as also should vitreous opacities. These are the cases in which the retina becomes detached after operation. The eye with the highest myopia should be chosen for operation. If the fundus of one eye is diseased neither should be touched.

The author has generally needled freely and then evacuated the swollen lens. In some cases a final needling of the capsule is necessary. On the whole it is safer to leave the second eye alone, especially when it is used for near vision as is frequently the case. Only one of Thompson's cases got detachment, and this occurred five years after operation.

T. HARRISON BUTLER.

VII.—MUSCLES AND NERVES.

243. MORRELL, R. A. **Observations on some cases of esophoria not caused by refractive errors.** *Lancet*, 1910, vol. ii., p. 1274.

244. TAMAMSCHEFF, C. **Paradoxical movements of the upper lid in oculomotor paralysis (pseudo-Graefe's phenomenon).** *Klin. Monatsbl. f. Augenheilkunde*, xlviii., p. 479.

245. BARTELS, M. I. **Regulation of the position of the eye through the ear. II. Strabismus and the ear.** *Arch. f. Ophthalm.*, lxxvii., 3, p. 531.

246. COPPEZ. **Nystagmography.** *Arch. d'opht.*, Bd. xxx., pp. 693–704.

247. RUTTEN. **New theory regarding the pathogenesis of miner's nystagmus.** *Soc. belg. d'opht.*, May, 1910.

248. REBER, W. **Some unusual effects of eyestrain.** *Ophthalmoscope*, Dec., 1910.

249. VERWEY, A. **Muscular asthenopia due to the influence of the position of the visual plane upon the equilibrium of the eyes.** *Nederlands Tijdschrift voor Geneeskunde*, 1910, Bd. ii., No. 4.

250. DOWLING, J. I. **Supraorbital neuralgia—two cases.** *Ophthalmology*, July, 1910.

MORRELL (243, **Observations on some cases of esophoria not caused by refractive errors**) calls attention to a class of cases in which there is no refraction error, nor muscle imbalance for distance, but if the balance be tested while the patient is accommodating, esophoria will be detected. The patients are generally of the overworked and neurasthenic type. The distant vision is good, and Jaeger No. 1 can be easily read with either eye, but with both vision is indistinct; the defect is cured by the use of +1.0 D sph., binocular near vision becoming quite clear, and the usual headache accompanying the condition disappearing. The author considers the cause to be due to excess of convergence, resulting from a loss of tone in the ciliary muscle whereby an increased effort of accommodation takes place and therewith an over-convergence; the relief given by the convex lens to the accommodation removes the cause of the excessive convergence. PAYAN DAWNAY.

TAMAMSCHEFF'S (244, **Paradoxical movements of the upper lid in oculomotor paralysis**) patient was a man 30 years old who had received a fracture of the base of the skull. There was a lesion of the right olfactorius, atrophy of the right opticus, and paralysis of the right oculomotorius. The ptosis was incomplete. The rigid pupil was of maximal diameter only on some days. Abduction of the eye produced an increase of the ptosis, while motor impulses to the paralyzed internal and inferior recti produced a decrease in the form of a distinct retraction of the paralyzed upper lid. Even when the fixation of the sound eye varied and the law of uniform innervation of the two eyes was employed, the impulse to lower and to adduct the eye excited spasmodic movements in the paretic levator palpebræ. The author explains this behavior of the levator by the assumption that a number of the regenerated nerve fibres were aberrant and supplied the levator, while they came from the nuclei of the rectus inferior

and rectus internus. Thus the levator was called into action by motor impulses sent to the rectus inferior and internus, while, on the contrary, in abduction of the eye the tonic innervation of the internus relaxed and with it that of the levator, thus allowing an increase of the blepharoptosis.

BARTELS (245, **I. Regulation of the position of the eye through the ear. II. Strabismus and the ear**) states that the cases of paralysis of the ocular muscles observed after otitis may not be reflex in their origin, but due to organic, direct nerve lesions. It is conceivable that aural lesions in the widest sense may call forth concomitant strabismus. When defects in the ear and faulty fusion coexist in an individual, the conditions are most favorable for strabismus. Bartels tested thirty children with convergent strabismus for rotation nystagmus, which was present in 50%. The angle of squint was greater and the errors of refraction less in cases with nystagmus than in the others.

COPPEZ (246, **Nystagmography**) has examined vestibular, congenital, and miner's nystagmus with the aid of the nystagmograph. Spontaneous vestibular nystagmus is the expression of the overbalance of the semicircular canals on the one side or the other. The not spontaneous vestibular nystagmus is excited by rotation, galvanic stimulation, thermic influences, and inflation of the ear. Vestibular nystagmus is always rhythmic; congenital nystagmus is wavelike. In general the irregular forms were observed in cases with extensive leucomata and cataract, the wavelike type in nyctalopia and hemeralopia (retinitis pigmentosa and albinism), the third kind chiefly in weak sight due to high degrees of hypermetropia, or in changes in the region of the macula and papilla. Miner's nystagmus is purely undulatory; irregular forms are quite exceptional. The oscillations vary from 150 to 240 per minute. CAUSÉ.

According to RUTTEN (247, **New theory regarding the pathogenesis of miner's nystagmus**), neither accommodative nor retinal weariness can cause nystagmus. Its cause lies rather in the reflex rolling of the eyes counter to the abnormal position of the body. DANIS.

REBER (248, **Some unusual effects of eyestrain**) recounts some most interesting cases in which small errors of refraction and muscle balance caused far-reaching effects upon the general well-being of the patients. In one case a quarter of a diopter of astigmatism completely wrecked the life of a young woman, but as soon as it was corrected a complete cure resulted.

T. HARRISON BUTLER.

VERWEY (249, **Muscular asthenopia due to the influence of the position of the visual plane upon the equilibrium of the eyes**) tested in persons of different age and condition of refraction the influence of the position of the visual plane upon the convergence of the visual lines by means of Maddox's rod and a phorometer. In almost all, the equilibrium of the eyes was highly dependent on the position of the visual plane. In the majority there was latent exophoria for near, which became less as the visual plane was lowered and greater as it was elevated (group 1), or the reverse (group 2). The esophoria of the minority was greater as the visual plane was lowered and less as it was raised (group 3); the inverse was rare (group 4). Near work with lowered visual planes is most convenient for groups 1 and 4. For groups 2 and 3 he recommends the use of a desk. R. P. VISSER.

DOWLING'S (250, **Supraorbital neuralgia—two cases**) cases of neuralgia of mechanical origin are of interest. In one a concretion was formed, supposedly within the walls of a dilated hair follicle, and pressed upon the nerve. In the other there was an osteitis in the region of the supraorbital foramen following traumatism. In both an operation for the removal of these causes was followed by relief. ALLING.

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ISSUED BI-MONTHLY. VOL. XL., No. 6

ARCHIVES

OF

OPHTHALMOLOGY

FOUNDED IN 1869 BY

DR. HERMAN KNAPP

EDITED IN ENGLISH AND GERMAN

BY

DR. ARNOLD KNAPP
OF NEW YORK

AND

DR. C. HESS
OF WÜRZBURG

AND

DR. W. A. HOLDEN
OF NEW YORK

NOVEMBER

NEW YORK
G. P. PUTNAM'S SONS { 2, 4, & 6 WEST 45TH STREET
27 & 29 WEST 23D STREET
AND NEW ROCHELLE, N. Y.
LONDON: 24 BEDFORD STREET, STRAND
WIESBADEN: J. F. BERGMANN'S Verlag
PARIS: J. B. BAILLIÈRE, 19 Rue Hautefeuille
1911

Price, per Number, $1.00 (4s. 6d.); per Year, $5.00 (£1.1.0)
Entered at the Post-Office, New Rochelle, N. Y., as Second-Class Mail Matter

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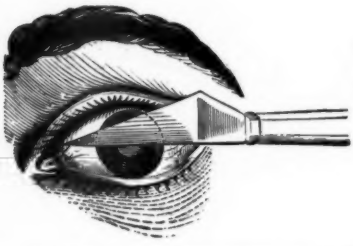

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